Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

In re:	)	
	)	MB Docket No. 17-105
COMMISSION LAUNCHES MODERNIZATION OF MEDIA REGULATION INITIATIVE	)	
	)	
FCC 17-58	)	
	)	

To: Office of the Secretary

Electronic Filing

COMMENTS OF SHAINIS & PELTZMAN, CHARTERED

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SUMMARY

Shainis & Peltzman, Chartered ("S&P") seeks modification of Section 74.1231(i) of the Commission's rules to allow FM booster stations to originate programming. The current prohibition, as discussed, stands in the way of competition and innovation in media markets. Modification of the rule would have significant public interest benefits.

The instant proposal will enable FM radio stations to provide targeted "hyperlocal" programming directed to specific portions of their service area, thereby furthering the Commission's longstanding broadcast localism goals. The proposal will also provide an effective means whereby small businesses can reach highly localized audiences in a cost-effective manner. The proposal will also promote improvement of the general financial health of the radio industry. It will also be an effective vehicle to create and stimulate job growth in all areas of the economy.

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COMMENTS OF SHAINIS & PELTZMAN, CHARTERED

Shainis & Peltzman, Chartered ("S&P"), a law firm representing numerous FM stations, submits its comments pursuant to the Commission's May 18, 2017 Public Notice, Commission Launches Modernization of Media Regulation Initiative, FCC 17-58 ("Public Notice"). In support, S&P submits the following:

I. PRELIMINARY STATEMENT

1. The Commission's *Public Notice* initiated a review of its rules applicable to media entities, including television and radio broadcasters, cable operators, and satellite television providers. The Commission succinctly stated the objective of the proceeding as follows:

"The objective of this proceeding is to eliminate or modify regulations that are outdated, unnecessary or unduly burdensome. By initiating this review, the Commission takes another step to advance the public interest by reducing unnecessary regulations and undue regulatory burdens that can stand in the way of competition and innovation in media markets... We also seek input regarding specific rules from which small businesses should receive regulatory relief.

We will take such comments into consideration in determining whether to propose modifying or eliminating the rules brought to our attention."

2. The instant comments are solely directed to the modification of Section 74.1231(i) of the Commission's rules to allow FM booster stations to originate programming under certain circumstances.[1] As will be discussed, adoption of the instant proposal will enable FM radio stations to provide targeted "hyperlocal" programming directed to specific portions of their service areas, thereby, furthering the Commission's longstanding broadcast localism goals. It will also provide an effective new means whereby small business can reach highly localized audiences in a cost-effective manner. Implementation of the proposal will also promote improvement of the general financial health of the broadcast radio industry. It will also be an effective vehicle to create and stimulate job growth in all areas of the economy.

II. BACKGROUND

3. On April 4, 2012, S&P, on behalf of a client, drafted and filed a Petition for Rulemaking, RM No. 11659. In that Petition, modification of 47 C.F.R. § 74.1231(i) was sought to allow for booster stations to originate programming. The request appeared on an April 23, 2012 Public Notice, See Public Notice, Consumers and Governmental Affairs Bureau, Reference Information Center, Petitions for Rulemaking Filed, Rpt. No. 2949. A number of comments were filed, all in support of the Petition. The Petition remains pending.

III. DISCUSSION

4. Localism has long been a core tenet of the Commission's regulation of terrestrial broadcasting. See Broadcast Localism, Notice of Inquiry, 19 FCC Rcd. 12425, 12425(2004)

[1] As currently written, Section 74.1231(c) of the Commission's rules provides in pertinent part the following:
"An FM broadcast station is authorized to retransmit only the signals of its primary station ... The FM booster station shall not retransmit the signals of any other station nor make independent transmissions, ..."

(noting that "localism has been a cornerstone of broadcast regulation for decades) ("Localism NOI"). The FCC's entire "broadcast regulatory framework is designed to foster a system of local stations that respond to the unique concerns and interests of the audience within the stations' respective service areas. See Broadcast Localism, Report and Notice of Proposed Rulemaking. 23 FCC Rcd 1324, 1327(2008). See also Localism NOI at 12427 ("All of these rules, policies and procedures reflect the Commission's overarching goal of establishing a system of local broadcasting that is responsive to the unique interests and needs of individual communities [within one station's large coverage area].") The instant proposal would promote the delivery of intensely localized broadcasts, including emergency information and news and public affairs programming to narrowly tailored geographic audiences.

5. As recognized by the FCC's "Working Group on Information needs of Communities," the Internet and other modern electronic platforms are increasingly focusing attention on "hyperlocal" issues and coverage. See generally The Information Needs of Communities: The Changing Media Landscape in a Broadband Age, Steven Waldman and the Working Group on Information Needs of Communities (July 2011), available at www.fcc.gov/infoneedsreport. Some broadcasters are attempting to utilize this new technology by, for example, leveraging their electronic news gathering expertise "to develop 'hyperlocalized' mobile news platforms that focus on the concerns of individual neighborhoods and even more narrowly defined communities." Id. at 139. In general, however, broadcasters have been impeded in their efforts to provide "hyperlocal" programming by the realities of broadcast signal propagation.[2] As a result, "hyperlocal neighborhood-based coverage [is] a form [of programming] that traditional media ... always struggled with..." Id. at 346. The adoption of the instant proposal will help

[2] "The larger and more diverse the region of coverage, the more difficult it is to address the full spectrum of issues that matter to ... citizens" Id. at 121.

alleviate this technological impediment by encouraging a new method whereby radio broadcasters can provide highly granular coverage and programming dedicated to extremely localized areas. In this regard, a new technology has been developed that allows for improved beneficial deployment and utilization of FM booster stations. The electronic synchronization will alleviate co-channel interference concerns long inherent in FM booster operation (i.e. on channel transmitters). Using this technology, a single FM station will be able to divide its signal at particularized times and for limited duration[3] into separate "zones", facilitating the provision of brief, highly localized programming targeted to specific geographic areas. If permitted for general use by the Commission, this innovative and efficient operation of FM boosters would enable extremely localized "multi-channel" FM broadcasts benefitting "hyperlocal" communities and the broadcasters serving them. To date this new FM booster technology has been employed through experimental authorizations issued by the Commission. The results of testing carried out under these authorizations have demonstrated that the technology operates effectively and provides the expected results. See Paragraph 3 supra. See Goldman Engineering Statement (Attachment AA). Mr. Goldman, a broadcast consulting engineer, is familiar with the current technology relative to the synchronization of booster systems. He states, inter alia, the following:

> "...it is now possible for synchronized boosters to not only improve coverage in shadowed areas, but also within a station's coverage area, allow specialized targeted information to be delivered with *de minimis* negative impact to listeners in the small and tightly controlled transition areas."

6. The only regulatory impediment hampering implementation of the synchronized FM booster operation envisioned by the April 4, 2017 Petition in RM No. 11659 is Section 74.1231(i) of the Commission's rules.

[3] When necessary, the utilization of the technology can be utilized for indefinite periods of time.

IV. PRECISE TARGETING OF EMERGENCY INFORMATION

7. The Commission has long recognized the need for an emergency alert system "that enables officials at the national, state and local levels to reach affected citizens in the most effective and efficient manner possible. See Review of the Emergency Alert System, First Report and Order and Further Notice of Proposed Rulemaking, 20 FCC Rcd. 18625, 18651 (2005). Most emergency alerts are, by their very nature, local and "the ability to deliver a ... local message is an essential element of an effective alert and warning system." Id. at 18652. By encouraging the use of FM booster technology in the manner proposed by the April 4, 2012 Petition, the Commission would promote the exceedingly effective and efficient targeting of emergency information and warnings to highly targeted geographic areas.[4] Such precisely aimed emergency messages – pertinent to highly specific locales – could prove more effective than messages broadcast to broader geographic areas which may have no relevance to many listeners. See Id. (noting that "[i]f listeners are deluged with too many emergency messages, ... most of which are inapplicable to them, then, emergency messages may well lose their impact.") In sum, the instant proposal provides great promise for the "use [of] technology to pinpoint specific households and neighborhoods at risk,"[5] and for effectively transmitting highly relevant emergency information about events like floods, road closures, accidents, and "Amber Alerts" to highly localized audiences. This is independent of any need to rely on wireless service.[6]

V. LOCALIZED NEWS, INFORMATION AND PUBLIC SERVICE PROGRAMMING

[4] The Commission has recently acknowledged this need. See FCC Proposes to Add Blue Alerts to the Nation's Emergency Alert System (Attachment BB).
[5] Localism NOI at 12436
[6] Even with an FM chip in a wireless device, the FM signal is limited by the distance the wireless device is from the FM station's transmission tower.

8. The instant proposal will allow stations to directly tailor informational programming to concurrently address the diverse needs of various groups in disparate communities across stations' broader service areas. In this regard, often, radio stations serve broad geographic areas that encompass and cross numerous neighborhoods, towns, counties, and even states with widely varying social, economic and linguistic interest and needs.

9. If the proposed rule change were enacted, a single FM station would be able to simultaneously target public service and informational announcements to several communities, thereby ensuring that each community's individualized announcement is highly immediate and relevant to residents in that community. Emergency preparation announcements, for example, could be tailored to provide contact information for the nearest emergency shelters. Weather reports and forecasts could be custom produced to take into account varying weather conditions within a station's broader services area.

10. Candidates for political office would also benefit from the ability to target paid political messages solely to relevant locales. Because the cost of more localized advertising would be lower, the targeted advertising would have the added benefits of cost-savings for election campaigns and assisting the public in receiving information concerning local issues.

11. For stations that serve geographical areas with extremely disparate informational needs, such as those transmitting to communities dispersed across distinct geopolitical boundaries like state lines, the proposal would greatly aid in the tailoring of news and information that is most relevant to localized communities. For example, it could provide separate targeted local sports information. It could also hyper-localize remote broadcasts. Multiple religious services could be broadcast.

VI. MORE EFFECTIVE METHOD FOR SMALL, LOCAL BUSINESS TO REACH CUSTOMERS

12. In addition to encouraging the tailoring and targeting of news, weather, emergency information, and informational and public affairs programming, the proposal would open the possibility for a new kind of commercial radio targeted advertising that is affordable for small businesses. This would appeal to small local businesses that previously may have been unable to benefit appreciably from radio advertising, or that may have found advertising on commercial radio stations to be prohibitively expensive. Businesses that provide services or goods to local communities – perhaps in one or two small towns on the outskirts of a larger city, or to an ethnic group residing predominantly in one area – may find current commercial radio advertising less effective and more expensive than more localized alternatives, because commercial radio signals generally transmit to relatively wide geographic areas with broad, generalized populations. Stated differently, the expensive coverage and broad appeal sought by regional and national advertisers is often not demanded or desired, by businesses catering to smaller, localized communities. Under the proposal, these small, local businesses would benefit from the opportunity to employ a new form of highly targeted, lower cost radio advertising.

13. Two examples help illustrate this potential benefit. First, consider a small family owned business, such as a restaurant located in Manassas, Virginia approximately 30 miles from the center of Washington, D.C. The Washington. D.C. radio market is dominated by powerful radio stations serving most or all of the metropolitan area. This family owned restaurant will likely be unable to afford and may little benefit from the broad geographic and demographic reach of advertising placed on most stations in the Washington market. However, the restaurant would likely be highly interested in placing advertisements that would reach a targeted audience located in or near the restaurant's actual service area, at a fraction of the cost of advertising on a station that covers the three-state metropolitan area.

14. Next consider a similar family owned restaurant in Bristol, Virginia, one of three independent cities, situated fairly distantly from one another, that compose the single Tri-Cities, Tennessee-Virginia market.[7] The Tri-Cities radio market is dominated by powerful radio stations that serve the entirely of the three-city, two-state metropolitan area. For the restaurant to reach its customers, who reside almost entirely in just one of three communities, by radio, it currently must "overreach" its desired customer base with advertisements transmitted across the entirety of the expansive market to all three of the widely dispersed cities. Such messages are distributed far more broadly, at a higher cost, than the restaurant may find necessary or economically feasible. But the restaurant would likely value the opportunity to reach its highly localized customer base – those residents who reside in Bristol, the one community the restaurant serves – especially, if messages were available at a reduced cost from those designed to reach all three cities.

15. In both of these cases, the cost of advertising on a "full" commercial radio station may far outweigh the perceived benefits for businesses like the ones discussed above. Implementing the technology discussed in the April 4, 2012 Petition would enable local businesses to reach a targeted audience at an appealing cost.

VII. THE PROPOSAL WILL CREATE NEW OPPORTUNITIES FOR COMMERCIAL RADIO BROADCAST STATIONS TO GENERATE INCOME

16. The broadcast radio industry is enduring unprecedented financial challenges. The past economic crisis and painfully slow recovery have hit broadcasters especially hard. Many businesses view advertising as discretionary and may reduce or eliminate such expenses during

[7] The market consists of the highly autonomous cities of Bristol, Tennessee—Virginia (combined Tennessee and Virginia population 44,537), Kingsport, Tennessee (population 48,205) and Johnson City, Tennessee (population 63,152). The three cities are located approximately 20-25 miles from one another and each is home to numerous businesses that cater almost exclusively to the residents in just one of the cities.

financially challenging times. The general economic malaise, combined with the rapid rise of "new media" competitors, many of which specialize in "hyperlocal" targeting of advertising messages has placed many broadcasters in a difficult position.

17 The instant proposal could help revitalize and invigorate sales of local radio advertising stations' sales staffs and could offer menus of localized "channel" options to potential advertisers. As described above, this could produce new advertisers, in particular, numerous small, local businesses that could not otherwise afford to advertise on commercial radio stations. Stations could combine highly targeted broadcast advertising messages with equally targeted on-line or mass marketing campaigns. In short, adoption of the proposal would help establish new and viable marketing opportunities for a broadcast radio industry eager to service a new group of potential customers.

VIII. THE PROPOSAL WOULD BE CONSISTENT WITH PRIOR COMMISSION RULE CHANGES

18. On prior occasions, the Commission has modified rules – and even created entirely new classes of broadcast service – in order to "serve very localized communities or underrepresented groups within communities." See Low Power Radio Service, Report and Order, 15 FCC Rcd. 2205, 2208 (2000). For example, when establishing the low power television ("LPTV") service, the Commission recognized that the stations' small coverage areas [would] lend themselves to programming to suite discrete groups in a community. See Low Power Television Service, Report and Order, 51 RR2d 476 (¶15) (1982). Later, in reviewing the successes of the LPTV service a dozen years after its creation, the Commission noted that:

> [t]he hallmarks of the LPTV service are TV "localism" and specialized "niche" programming. Many LPTV stations are local news and public affairs programs and significant amounts of other locally produced programming. LPTV stations serve the needs and interests of many different ethnic communities, often airing programming in foreign

> languages. Specialized audiences of LPTV stations have included children, the elderly, students, tourists, farmers and boaters.[8]

19. It should also be noted that when the Commission authorized AM stations to rebroadcast their programming on FM translators, and to originate programming on the translators even when the AM stations are not authorized to broadcast, it did so because evidence submitted by broadcasters and other participants indicated that "AM broadcasters provide hyper-local information to many areas of the country, especially small towns and rural areas..." See Amendment of Service and Eligibility Rules for FM Broadcast Translator Stations, Report and Order, 24 FCC Rcd. 9642, 9668 (2009) (Statement of Commissioner Robert M. McDowell.) The Commission wished to "further [its] goal of service by [these] stations to their local communities ... [with such programming as] local news, sporting events and issues of local interest." Id. at 9650.

20. The Commission has also previously recognized the potential benefits to businesses that hyperlocal broadcasting can provide. For example, as it pondered the establishment of the low power FM ("LPFM") radio service, the Commission observed that with their "relatively small coverage area ... LPFM stations might be able to offer very localized exposure attractive to local businesses that could not otherwise afford radio advertising." See Creation of a Low Power Radio Service, Notice of Proposed Rulemaking, 19 CR 2055 (¶ 13)(1999).

21. As evidenced by these prior proceedings, the Commission has previously acknowledged on several occasions, and has modified or created technical rules designed to promote highly localized broadcast service. Furthermore, the FCC has acknowledged the important role community-based advertising can play in financial support for the broadcasting industry. The April 4, 2012 Petition seeks Commission consideration of a modest rule change which, as

[8] Low Power Television Service First Report and Order, 9 FCC Rcd. 2555, 2555 (1994).

evidenced by the data filed with the Petition, is technically feasible. Implementation of the proposed rule change will provide tangible benefits to local listeners, businesses, and the broadcast radio industry as a whole.

IX. OPERATION OF BOOSTERS IN THE MANNER PROPOSED IN APRIL 4, 2012 PETITION MINIMIZES CO-CHANNEL INTERFERENCE, AND CREATES NO NEW HARMFUL INTERFERENCE

22. As explained in detail in the previously filed Petition and its technical exhibits, the current technology minimizes the co-channel interference that has long presented challenges to FM booster design and operation. The results of testing conducted in three distinct environments, evidenced minimal interference coming from co-channel boosters themselves, or among co-channel boosters and their primary stations.[9] Section 74.1203(c) provides that an FM booster station may cause limited interference to its primary station's signal, provided it does not disrupt the existing service of its preliminary station or cause such interference within the boundaries of the principal community of the primary station. All tests performed were fully compliant with this rule, and S&P is not requesting any modification of this requirement. Furthermore, because FM boosters, by definition, operate only within the preliminary service contours of their main stations, the development and operation of boosters in the manner envisioned will not create harmful interference to other broadcast stations. The instant proposal does not necessitate changes to any of the Commission's interference rules of standards.

X. MODIFICATION OF THE RULE IS CONSISTENT WITH THE STATED OBJECTIVES OF THE COMMISSION'S MEDIA REGULATION INITIATIVE

23. From the foregoing it is clear that Section 74.1231(i), as currently in place, stands in the way of innovation and investment that would benefit consumers. The Commission is desirous of

[9] See Paragraph 3, supra. Also, copies of the tests are attached to the instant submission. See Attachments A, B, and C.

modernizing its rules in order to promote the public interest and clear a path "for more competition, innovation, and investment in the media sector." See May 18, 2017 Public Notice, FCC 17-58.

24. It is generally understood that the vast majority of Americans look to radio and TV as their media of choice during a crisis. See Attachment D.

25. Modification of the rule will allow terrestrial radio to become more competitive to online radio. It has been reported that large advertisers in automotive, telecom and even the usually reliable restaurant industry divert dollars from traditional media to digital and social media. See Attachment E. Attachment F discusses the metrics of in car listening and how this relates to point-of-sale purchasing. There is a real connection between location and a decision to make an acquisition or purchase. ZoneCasting for radio would clearly be an economic boost for radio and truly make it a competitive force with geo-targeting of content emanating from wireless mobile devices.

26. Another upside would be job creation. The increase of potential advertising revenues would have far reaching economic effects. Besides generating more revenue for the radio industry, it would also have implication for job creation for the radio industry but also for a number of segments of the economy.

XI. CONCLUSION

27. For the reasons articulated, S&P respectfully requests that the Commission proceed to initiate a rulemaking proceeding proposing to modify Section 74.1231(i) of the Commission's rules to permit origination of programming by FM booster stations.

Respectfully submitted,

SHAINIS & PELTZMAN, CHARTERED

July 3, 2017

By: 

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ATTACHMENT A

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July 29, 2010

VIA HAND DELIVERY

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FILED/ACCEPTED

JUL 29 2010

Federal Communications Commission
Office of the Secretary

Re: KDUT(FM), Randolph, Utah
Experimental Test Result

Dear Ms. Dortch:

Lazer Spots, LLC (formerly GEO Spots, LLC) submits the following report that was done pursuant to the Commission's March 29, 2010 issuance of an experimental authorization to be used with the above-referenced station. If there are any questions with respect to this matter, please communicate with the undersigned.

Sincerely yours,

Aaron P. Shainis

Aaron P. Shainis
Counsel for
Lazer Spots, LLC

STAMP & RETURN

Report to the FCC on the
Lazer Spots, LLC
Bustos Media of Utah License, LLC
KDUT(FM) Experimental Test Report

Lazer Spots, LLC
737 North Michigan Avenue
Suite 2350
Chicago, IL 60611

July 15, 2010

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I. EXECUTIVE SUMMARY

BACKGROUND FOR TEST AUTHORITY

On March 9, 2010, Bustos Media of Utah License, LLC ("BMU"), the licensee of KDUT(FM), Randolph, Utah; KDUT-FM1, Bountiful, Utah; KDUT-FM2, Salt Lake City, Utah; KDUT-FM3, Ogden, Utah; and KDUT-FM5, Provo, Utah submitted a request for an experimental authorization (Attachment A). In that request, BMU, in conjunction with the assistance of Lazer Spots, LLC (formerly GEO Spots, LLC), sought Commission approval to allow it to utilize boosters associated with KDUT to originate limited programming. Specifically, the intent was to simultaneously broadcast of each of the aforementioned boosters different non-commercial announcements targeted to discreet audiences. The broadcasts were to be targeted to appeal to specific audiences encompassed within the booster's service areas. The proposal was for each of the boosters in question to concurrently broadcast a different non-commercial message.

On March 29, 2010, the Commission granted the experimental authorization (Attachment B). The authorization specified that "within 60 days following completion of the experimental operation authorized herein, BMU shall file a report of the research, experimentation and results with the Commission pursuant to Section 73.1510(d)."

On May 26, 2010, an additional 60 days was requested to complete the experimental broadcasts (Attachment C). On June 3, 2010 the Commission granted the request and extended the testing through August 3, 2010 (Attachment D).

GENERAL DESCRIPTION OF TEST

Conventionally planned FM broadcasting networks consist of transmitters with independent program signals on individual FM radio frequencies as allocated and regulated by the FCC. The allocation of the radio frequency for each transmitter and protected service and interference contours are defined by the FCC in Part 73 of Title 47 and FM Translator and Booster Rules in Part 74. Boosters are defined as transmitters which broadcast within Main station's coverage area (a "fill-in") on the same channel and frequency, and were created to allow FM stations to provide supplementary service to areas in which direct reception of radio service is unsatisfactory due to distance or intervening terrain barriers. Lazer Spots, LLC has developed a system that will allow an FM radio station to divide its signal into segments with the use of proprietary booster system design, audio and control switching, routing, hardware, software and implementation techniques. This new idea would allow the station to run different audio messages, such as Public Service Announcements (PSAs) on different booster transmitters simultaneously, thereby creating additional time capacity for such announcements. Lazer Spots™ holds a patent pending application for "Equipment, System and Methodologies for Segmentation of Listening Area into Sub-Areas Enabling Delivery of Localized Auxiliary Information". The concept of adding FM boosters to an existing FM broadcast station within the protected service area of the main station and specifically designed for targeted messaging is an expertise of Lazer Spots, LLC. It allows the ability to target listeners with more local relevant information as well as free up valuable broadcast messaging time.

The KDUT broadcast system has four boosters covering four distinct areas: Ogden, Bountiful, Salt Lake City, and Provo, UT.

MAIN	KDUT	41° 15' 55.00" N	110° 33' 20.00" W	89.00 kW ERP
BOUNTIFUL BOOSTER	KDUT-FM1	40° 50' 5.00 " N	111° 52' 3.00 " W	0.099 kW ERP
SALT LAKE CITY BOOSTER	KDUT-FM2	40° 48' 29.00" N	111° 53' 23.00" W	0.099 kW ERP
OGDEN BOOSTER	KDUT-FM3	41° 09' 57.00" N	112° 00' 52.00" W	5.600 kW ERP
PROVO BOOSTER	KDUT-FM5	40° 18' 0.00 " N	111° 38' 38.00" W	0.099 kW ERP

Table One: Booster Locations

In the KDUT(FM) FCC defined service contour (60 dBμV/m), the four boosters create four distinct coverage areas, in terms of RF isolation and segregated markets. Distinct Public Service Announcements (PSAs) were tested as each market area was broadcasting a distinct PSA spot at the same time.

The tests as presented in this report were performed in June 23-26 of 2010, after modifications to the broadcast audio distribution (within the studio and in the studio-to-transmitter (STL) links) system were made to implement the targeted messaging concept.

In terms of market test locations, it is well known that the Salt Lake City market is favorable with regards to implementation of boosters, to increase signal level due to terrain blockage and mitigate multipath interference due to reflections from the surrounding terrain. It is important to note that in the test of KDUT(FM), no modifications to the main KDUT(FM) broadcast transmitter nor to any of the four KDUT(FM) boosters were implemented to the effective radiated RF power, broadcast antennas or geographical locations. Given the favorable results obtained and presented in this report we believe this is a very significant actuality.

CONCLUSION

The results of the testing, which occurred on June 23-26 of 2010, demonstrate that not only is the concept technically feasible but it is also of great value to the future of terrestrial FM radio broadcasting. Specifically, different announcements were broadcast to separate and discreet listeners concurrently. The quality of the announcements was not impaired to any significant degree. The attached audio clips for each of the measurement locations are provided for subjective verification of these results.

II. SUMMARY OF TEST RESULTS

Conventionally planned broadcasting networks consist of transmitters with independent program signals and with individual radio frequencies. The allocation of the radio frequency for each transmitter and protected service and interference contours are defined by the FCC in Part 73 of Title 47 and FM Translator and Booster Rules in Part 74. Lazer Spots, LLC has developed a proprietary (Lazer Spots™) system and technology that will allow a broadcast FM radio station

to divide its signal into segments with the use of carefully engineered booster transmission points. This new concept would allow the broadcaster to run different audio messages, such as Public Service Announcements (PSAs) on different booster transmitters simultaneously, thereby creating additional time capacity for such announcements. It allows the ability to target their listeners with more specific (i.e. hyper-local) relevant information, as it increases valuable broadcast messaging time.

The Lazer Spot™ approach is considerably different from the conventional broadcast coverage enhancement-only approach in that the purpose is to broadcast specific Public Service Announcements (PSAs) to a specific geographical area and potentially demographical listening audience, for a limited amount of broadcast time. For example, in this test two or three 30 second Targeted spots were broadcast, three to four times per hour.

It is common for FM analog booster implementations to create some amount of interference. The Lazer Spots™ proprietary system is designed to i) minimize interference in general using its patent pending design technology and software and routing capabilities, and ii) placing the simulcast interference areas that occur where there exists diminutive population counts and demographically determined non-listeners of the specific broadcast station. It is also important to point out that the overall benefit of the targeted messaging approach far outweighs the relatively small interference that occurs with booster implementations, especially when the design is such that it is engineered to minimize this occurrence to the listening public.

In the KDUT(FM) test, the submitted audio clips were recorded in the field from 6/23/2010 to 6/25/2010. Audio information was collected at 20 geographical locations and described in detail later in this report. At each of the 20 test locations, a measurement of the 'Non-Targeted', normal simulcast audio were made for a single PSA spot. This is referred to as the reference PSA spot and used as a comparative reference to the 'Targeted' spot. For the targeted-test mode, distinct spots were broadcast on each adjacent booster. These spots were not in simulcast synchronization mode, as normally would be the case. The goal was to monitor and analyze the audio at the 20 test locations for quality of reception as compared to the Non-Targeted PSA spot.

The results in this report indicate an objective 'before and after' analysis of the Non-Targeted and Targeted Audio spots. The audio clips for each of the measurement locations is also provided with this report for subjective analysis, which correlate very well based on listener feedback. In fact, under no case could the Non-Targeted audio be considered imperceptible, as defined in this report under ITU-R definitions. In fact, for the measured tests the average statistical difference between the objective audio quality measurements for the Non-Targeted and Targeted Audio spots are a mere 1%. If the guidelines for quality measurements of rounding to the nearest tenth of a decimal were made as suggested by the ITU-R[1], then NO objective perceptible difference is found on average for the KDUT-FM test. This is exciting, ground breaking news as Lazer Spots, LLC did not modify the commercially operating RF broadcast transmission parameters of KDUT-FM as previously mentioned.

[1] RECOMMENDATION ITU-R BS.1284-1*General methods for the subjective assessment of sound quality

III. FIELD TEST PROCEDURE

BOOSTER LOCATIONS

The KDUT broadcast system has four boosters covering four distinct areas: Ogden, Bountiful, Salt Lake City, and Provo, UT. The tests presented in this report were performed from June 23-26 of 2010, after modifications to the broadcast audio distribution (within the studio and in the studio-to-transmitter (STL) links) system were made to implement the targeted messaging concept.

MAIN	KDUT	41° 15' 55.00" N	110° 33' 20.00" W	89.00	kW ERP
BOUNTIFUL BOOSTER	KDUT-FM1	40° 50' 5.00 " N	111° 52' 3.00 " W	0.099	kW ERP
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OGDEN BOOSTER	KDUT-FM3	41° 09' 57.00" N	112° 00' 52.00" W	5.600	kW ERP
PROVO BOOSTER	KDUT-FM5	40° 18' 0.00 " N	111° 38' 38.00" W	0.099	kW ERP

Table Two: Booster Locations

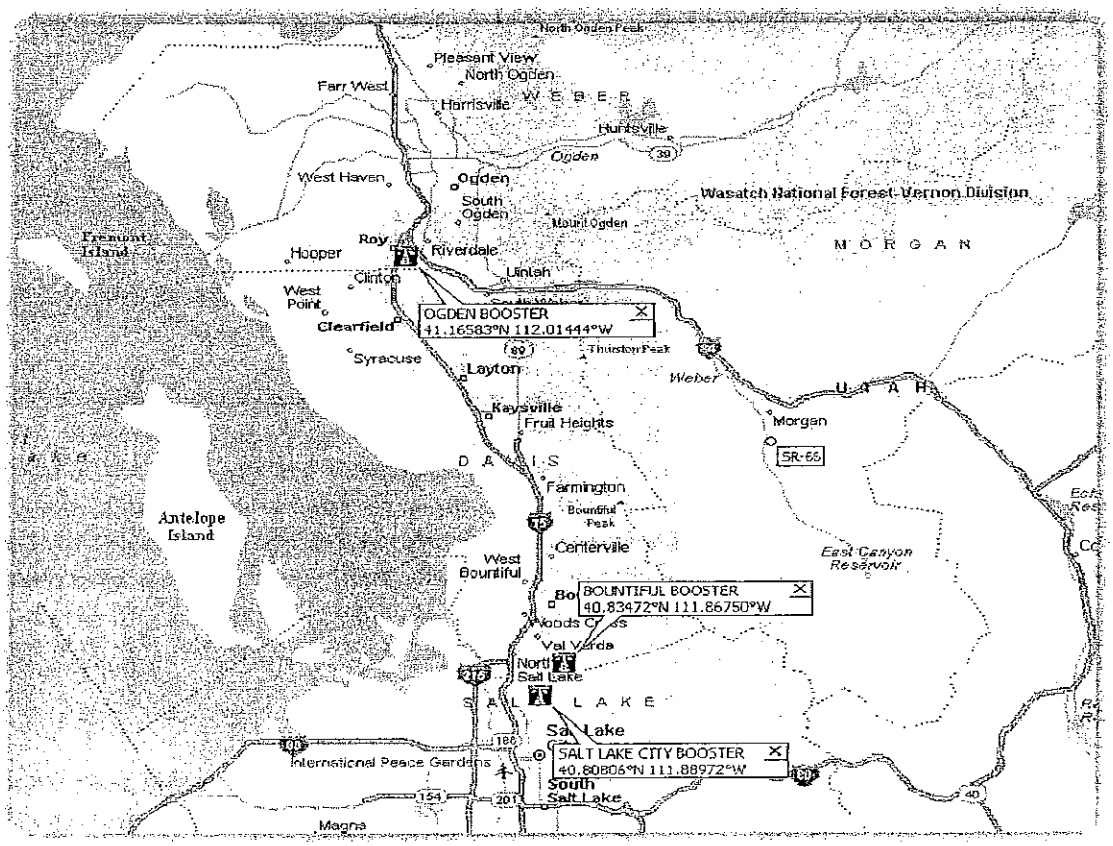

Figure One: North Booster Locations

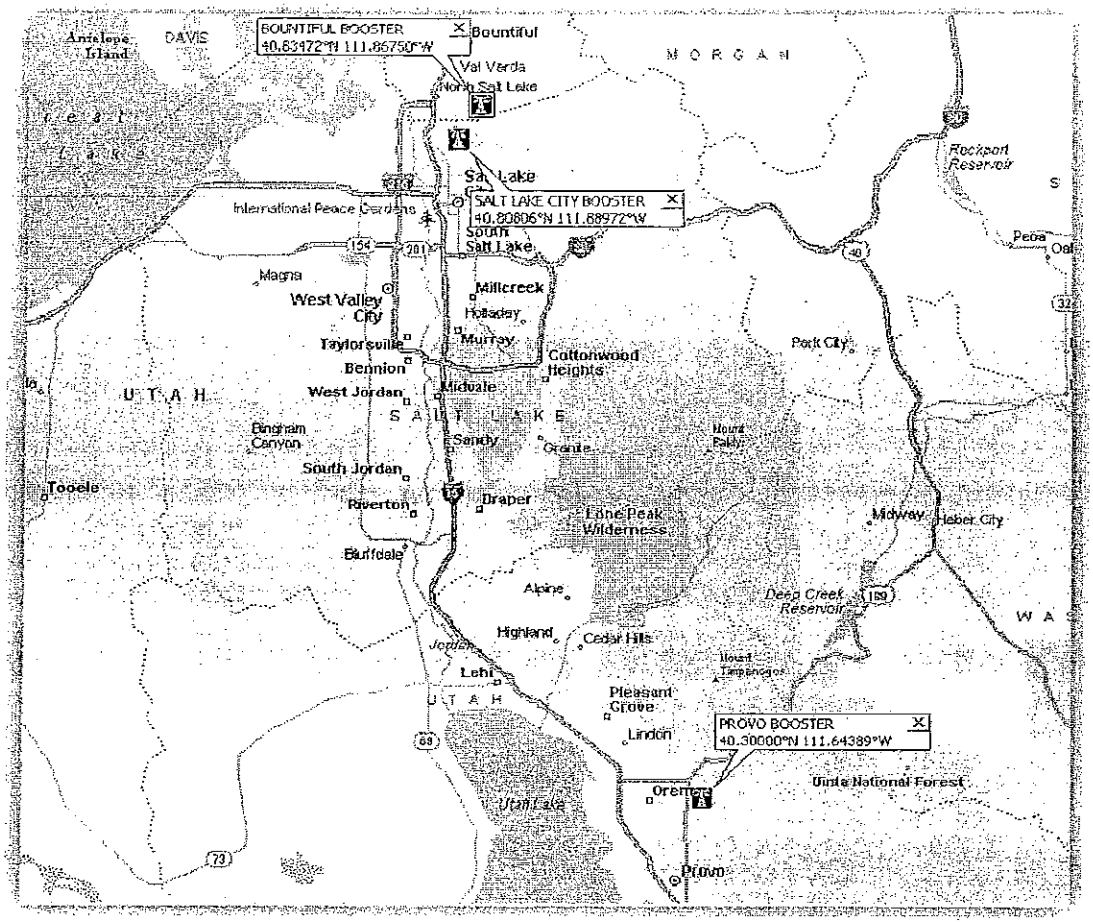

Figure Two: South Booster Locations

DRIVE TEST LOCATIONS

Preliminary testing occurred on 6/1/2010 to 6/7/2010 to determine appropriate test locations and drive distances between test locations. It is important to point out that 15 minutes or 30 minutes elapsed between the PSA spots, so drive distances had to be determined- typically 5-10 miles apart, and compensated by roads, construction delays, and alternate routes for high traffic or accidents. A typical test location was in an empty large parking lot with no close obstructions.

The 20 test locations were made in a stationary vehicle with sophisticated RF receiver and measurement software. Extreme care was taken to measure the Non-Targeted PSA spot and Targeted PSA spot (before and after) while the vehicle was within 1-1.5 meters each time, with the same vehicle orientation. With a few exceptions as discussed in the RF analysis section, the results were shown to be very close from a RF signal level measurement for each location. The coverage areas are divided into four maps shown below. This is based on the dominant coverage area for each of the four boosters under study.

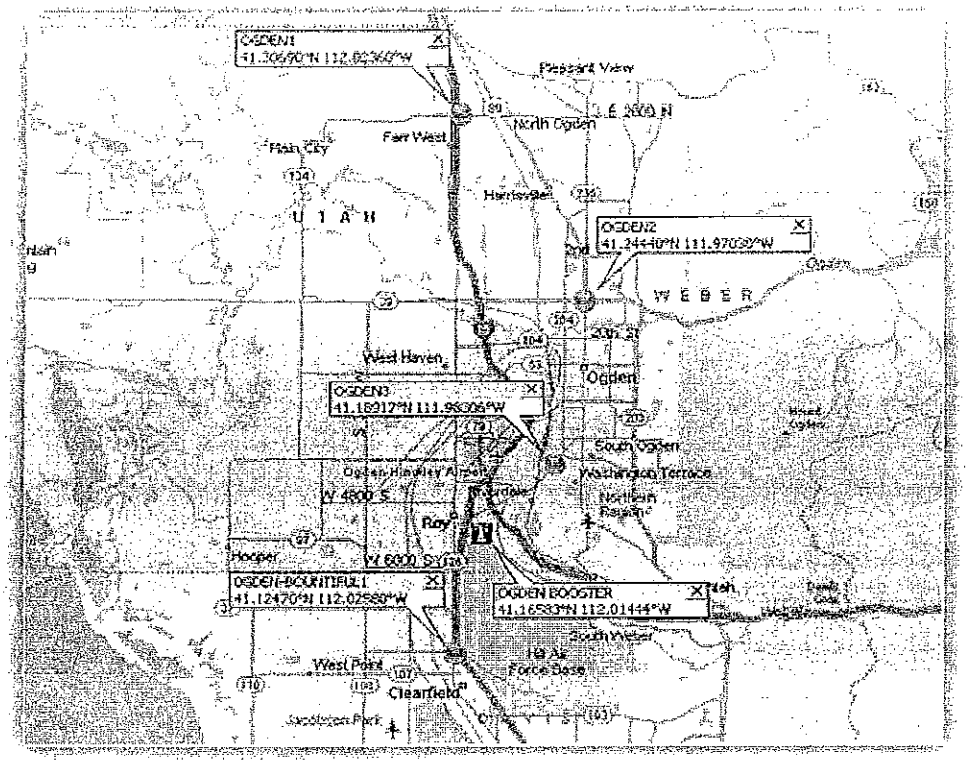

Figure Three: Ogden Test Locations

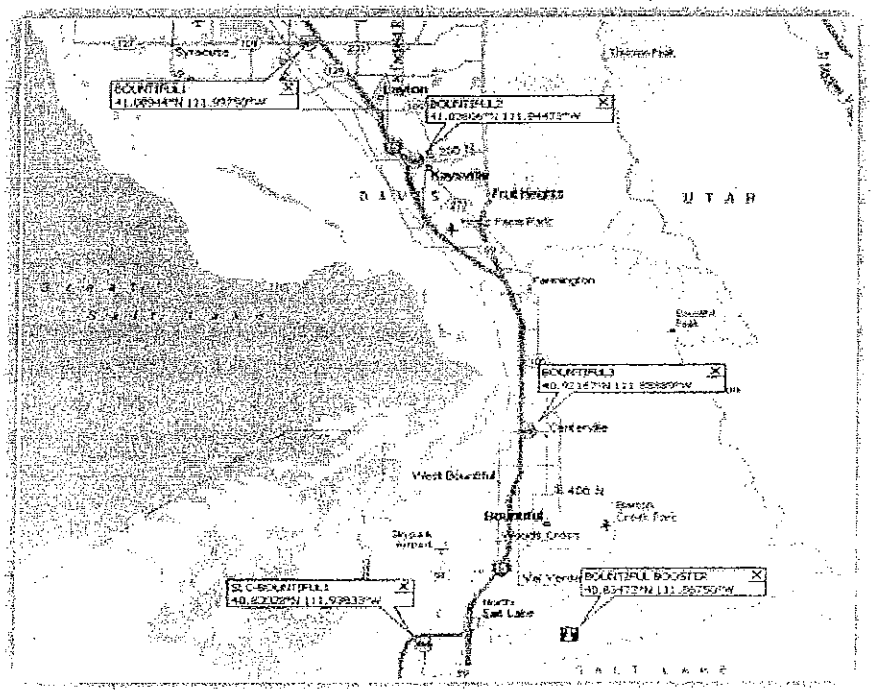

Figure Four: Bountiful Test Locations

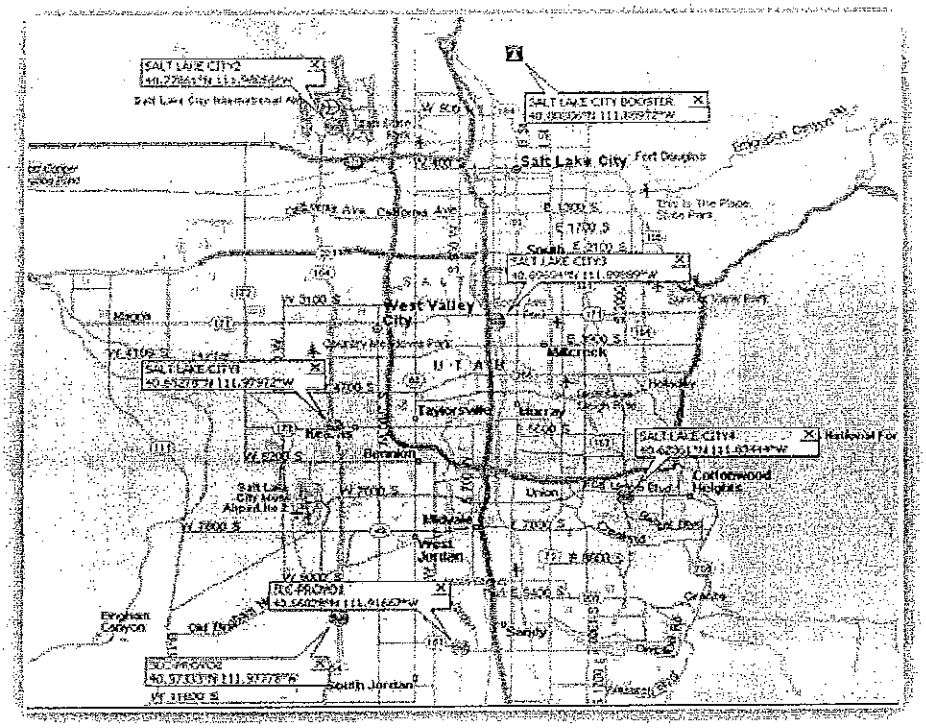

Figure Five: Salt Lake City Test Locations

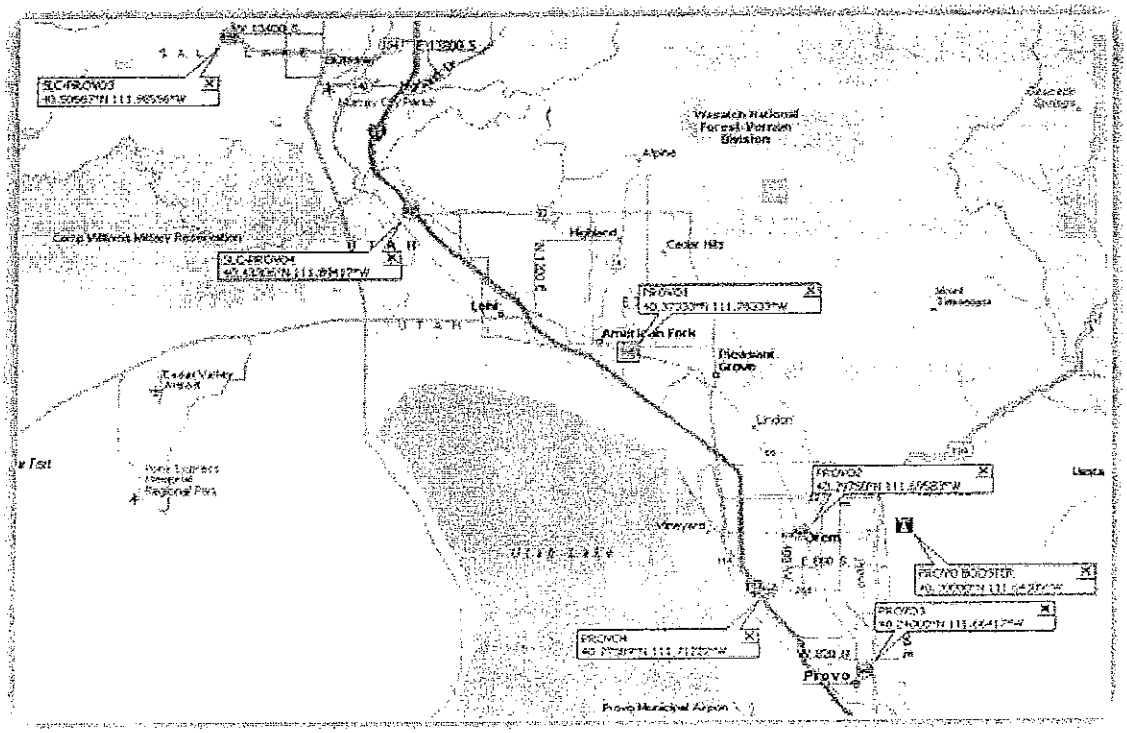

Figure Six: Provo Test Locations

NAMING CONVENTION OF MEASUREMENT LOCATIONS

Each of the 20 test locations was given a name based on both the proximity to the closest booster and the estimated booster coverage zone that it existed. The following table indicates the distances from a test location to relevant booster(s).

COORDINATES		LOCATION	BOOSTER DISTANCE (MILES)			
North	West		Ogden	Bountiful	SLC	Provo
41-18-24.8	112-1-25.0	OGDEN1	9.75	33.59		
41-14-39.8	111-58-13.1	OGDEN2	5.89	28.78		
41-11-21.0	111-58-59.0	OGDEN3	2.30	25.19		
41-7-28.9	112-1-32.9	OGDEN-BOUNTIFUL1	8.17	26.31		
41-5-22.0	111-59-51.0	BOUNTIFUL1	5.35	18.85	19.63	
41-2-17.0	111-56-41.0	BOUNTIFUL2	9.54	14.60	8.35	
40-55-18.0	111-53-20.0	BOUNTIFUL3	18.08	6.10	7.84	
40-49-49.0	111-56-18.0	SLC-BOUNTIFUL1		3.73	2.97	
40-39-10.0	111-58-47.0	SALT LAKE CITY1		13.87	11.71	
40-46-43.0	111-58-50.0	SALT LAKE CITY2		7.08	5.18	
40-41-49.0	111-53-56.0	SALT LAKE CITY3		9.65	7.68	
40-37-25.0	111-50-4.0	SALT LAKE CITY4		14.67	13.05	
40-33-37.0	111-55-0.0	SLC-PROVO1			17.16	23.01
40-34-24.0	111-58-40.0	SLC-PROVO2			16.84	25.80
40-30-24.0	111-59-8.0	SLC-PROVO3			21.40	22.98
40-25-59.0	111-53-39.0	SLC-PROVO4			25.88	16.09
40-22-24.0	111-47-0.0	PROVO1				8.93
40-17-51.0	111-41-45.0	PROVO2				2.75
40-14-24.0	111-39-51.0	PROVO3				4.28
40-16-26.0	111-42-44.0	PROVO4				4.04
41-9-57.0	112-0-52.0	OGDEN BOOSTER				
40-50-5.0	111-52-3.0	BOUNTIFUL BOOSTER				
40-48-29.0	111-53-23.0	SALT LAKE CITY BOOSTER				
40-18-0.0	111-38-38.0	PROVO BOOSTER				

Table Three: Booster Naming Convention

TEST MEASUREMENT EQUIPMENT AND RESULTS

The Audemat-Aztec FM-MC4™ was used to collect the audio samples in the field. The FM-MC4™ is a professionally calibrated FM receiver with a GPS receiver, and all the measurements are automatically logged. It is an FCC approved calibrated receiver supplied with a calibrated antenna.

GoldenEar™ is a software product which was used with the FM-MC4™ Measurement Receiver. It is intended to evaluate the overall quality of an FM station reception through signal measurements and audio recording.

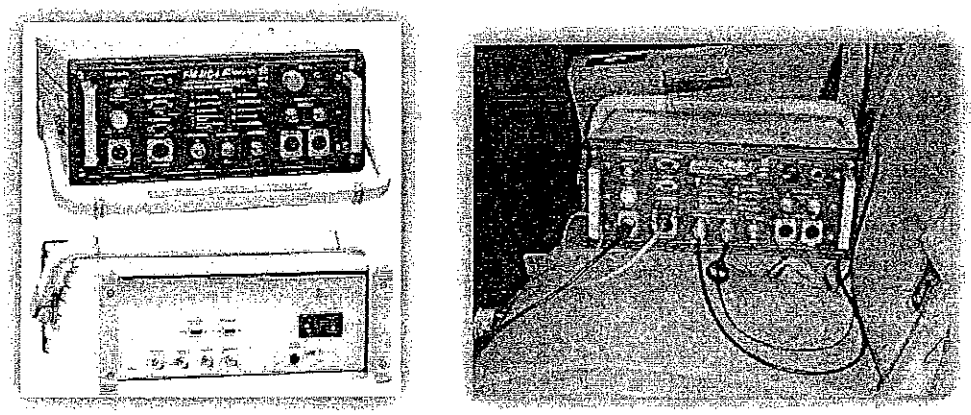

Figure Seven: Audemat FM-MC4™

An example of a GoldenEar™ multipath plot is shown for the Salt Lake City test locations:

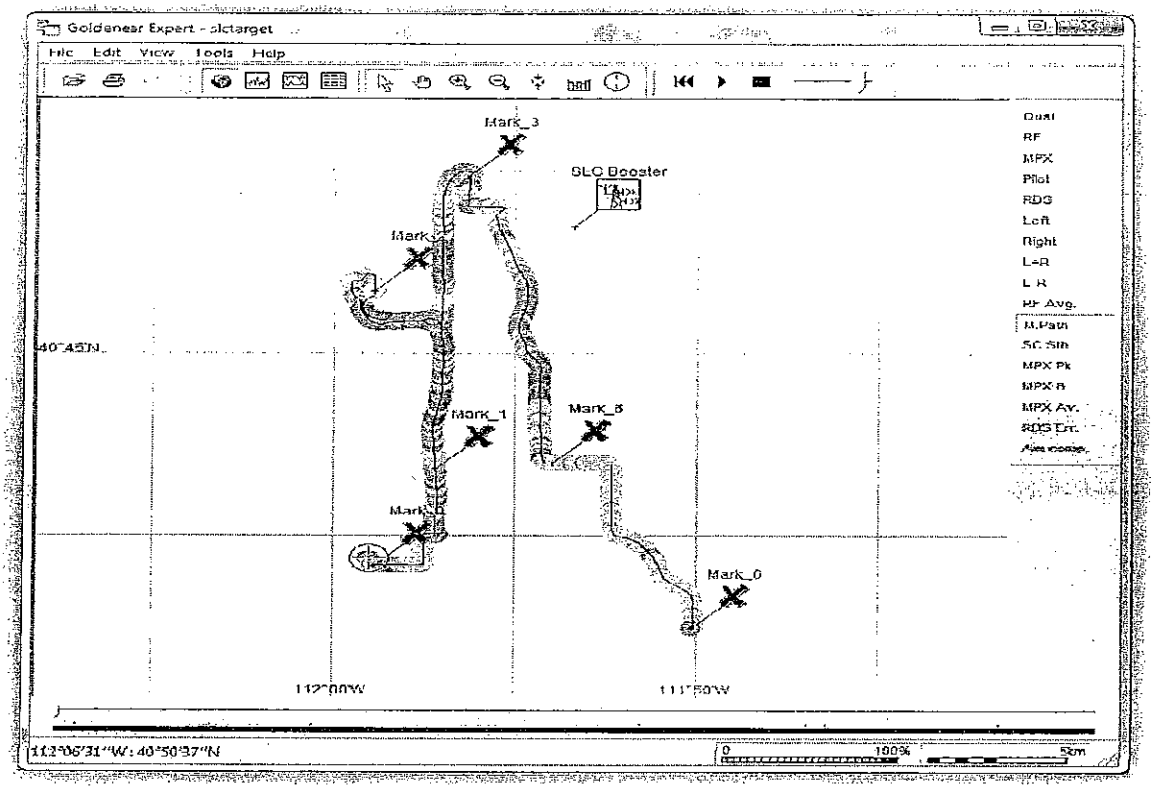

Figure Eight: GoldenEar™ SLC Plot

The FM-MC4 enables the following main operations to be carried out on a FM audio signal:

- Quantifying the signal value constituting the Base-band MPX signal
- Quantifying the MPX signal's power value
- Quantifying the demodulated signals' value constituting the audio message
- Ensuring different processing of these quantifications (corrections, averages, statistical calculations, phase, synchronization)
- Ensuring different representations of these quantifications.

The FM-MC4 measurement receiver is also acquires raw data from the FM broadcasting station. These signals are read in digital form through the PC interface. They include:

- RF level
- MPX and sub-carriers (19 kHz Pilot)
- Demodulated audio signals (Left, Right, Left+Right, Left-Right)
- Stereo information.

From these raw signals, several calculated signals are deduced:

- Averaged RF level
- Multipath ratio
- Sub-carrier stability (variation ratio over nominal level)
- MPX exceeding (over nominal level)

The first signal processing is done within the FM-MC4™. The signal concerned by the acquisition is the Multiplex signal whose format is defined by a maximum pass-band of 100 kHz. This analog MPX signal is converted into a digital signal using an A/D converter. Sampling frequency is fixed at 256 kHz, which guarantees quantification of any signal up to theoretical maximum frequency of 128kHz. For subjective listening the audio output of the receiver was recorded digitally in a (CCIT 22.050 kHz, 8-bit, stereo, 43 Kbps sampling rate) WAV file format by the GoldenEar™ software.

In term of RF signal level, two output methods are possible and both are presented:

Relative field: dBμV/m, mV/m
Absolute field: dBμV, dBm

For conversion of the Absolute field (dBμV) into a Relative field (dBμV/m), several calibrated files are supplied with the FM-MC4™, including: K coefficient validation, RF Antenna and Cable validation, and Loss and Gain validation. Appendix One contains details on these files.

The GoldenEar™ software is meant to provide a numerical method for quantifying a pure subjective concept, which is quality of received FM audio. As the method is a numerical one, it will be applied every time the same way, therefore it is an objective measure, as opposed to having numerous subjects listen and evaluate the audio.

An example graphical output is shown below, indicating RF level (Green), Pilot Stability (Dark Blue), Multipath Ratio (Grey), and L+R (Light Blue), for a portion of a stationary PSA measurement recording.

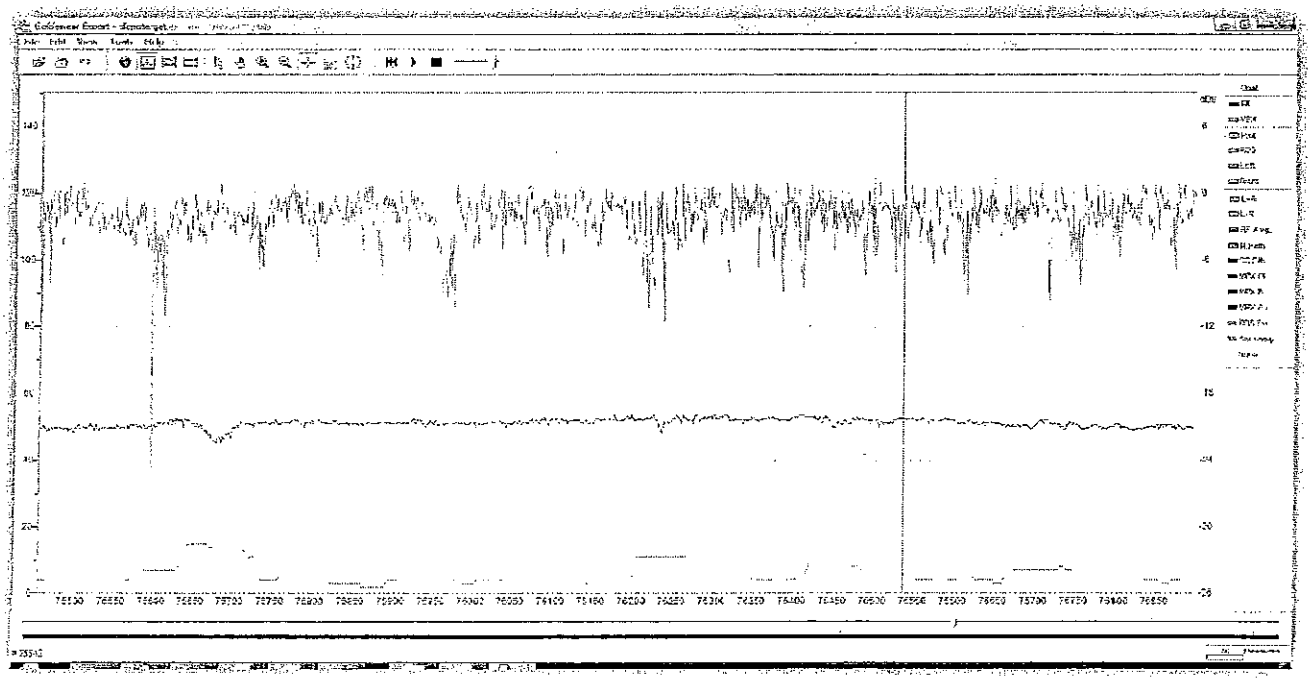

Figure Nine: GoldenEar™ Signal Display

MEASUREMENT VEHICLE

The measurement vehicle used in this test was a 2010 Ford Flex Crossover AWD. It was chosen because of the very large, flat metal roof with no obstructions, providing a ground plane to minimize pattern disturbances for the magnetic mount whip antenna. It should be noted that the FM-MC4™, antenna and cable were professionally calibrated at Audemat Labs in Paris on 4/7/2010.

Exterior	
Length: 201.8 in.	Width: 75.9 in.
Height: 68 in.	Wheel Base: 117.9 in.
Curb Weight: 4643 lbs.	

Figure Ten: Test Vehicle

RF MEASUREMENT RESULTS

Non-Targeted Tests	Absolute field dBμV	Relative field dBμV/m	MPX Level (kHz)	Pilot subcarrier (kHz)	Multipath ratio (%)
OGDEN-BOUNTIFUL1	38.29	51.46	79.02	6.34	6.17
OGDEN1	41.71	54.88	63.81	6.99	9.24
OGDEN2	53.15	66.32	54.60	6.16	4.25
OGDEN3	60.71	73.88	53.22	6.09	25.95
BOUNTIFUL1	37.11	50.28	97.95	6.18	8.12
BOUNTIFUL2	38.01	51.18	77.23	6.18	6.89
BOUNTIFUL3	56.08	69.25	85.57	5.90	4.97
SLC-BOUNTIFUL1	55.18	68.35	73.59	6.60	4.00
SALT LAKE CITY1	51.04	64.21	60.70	5.91	2.83
SALT LAKE CITY2	48.74	61.91	59.26	5.90	2.93
SALT LAKE CITY3	52.83	66.00	56.70	5.88	5.89
SALT LAKE CITY4	43.35	56.52	57.85	5.96	3.88
SLC-PROVO1	29.64	42.81	64.86	6.35	7.49
SLC-PROVO2	47.34	60.51	59.94	5.93	3.36
SLC-PROVO3	34.77	47.94	73.04	6.62	8.94
SLC-PROVO4	30.01	43.18	67.92	7.18	13.63
PROVO1	49.84	63.01	69.05	6.65	9.58
PROVO2	59.73	72.90	57.58	6.61	5.77
PROVO3	46.49	59.65	57.44	6.75	13.07
PROVO4	41.62	54.79	58.44	6.74	6.66
Average of 20 Locations	**45.78**	**58.95**	**66.39**	**6.35**	**7.68**

Table Four: Non-Targeted Spot Measured Parameters

Targeted Tests	Absolute field : dBμV	Relative field : dBμV/m	MPX Level (kHz)	Pilot subcarrier (kHz)	Multipath ratio (%)
OGDEN-BOUNTIFUL1	39.61	52.78	89.13	6.08	7.09
OGDEN1	44.09	57.26	70.97	6.68	8.32
OGDEN2	51.36	64.53	65.24	6.46	9.08
OGDEN3	62.70	75.87	62.58	5.93	3.03
BOUNTIFUL1	39.04	52.21	82.48	5.91	6.17
BOUNTIFUL2	36.95	50.12	82.61	5.93	6.47
BOUNTIFUL3	56.34	69.51	79.61	5.92	2.85
SLC-BOUNTIFUL1	57.16	70.33	72.45	6.19	3.52
SALT LAKE CITY1	53.03	66.20	67.88	5.90	18.33
SALT LAKE CITY2	48.58	61.74	65.27	5.88	4.70
SALT LAKE CITY3	60.20	73.36	65.78	5.88	2.88
SALT LAKE CITY4	39.09	52.26	72.79	6.23	6.19
SLC-PROVO1	34.37	47.54	73.45	6.10	9.50
SLC-PROVO2	44.06	57.23	67.29	5.89	4.48
SLC-PROVO3	36.97	50.14	83.31	6.58	23.47
SLC-PROVO4	28.83	42.00	97.85	8.47	26.49
PROVO1	49.46	62.63	72.48	6.70	22.26
PROVO2	59.73	72.90	69.28	6.66	3.53
PROVO3	46.02	59.19	71.26	6.66	12.30
PROVO4	41.39	54.56	69.35	6.74	7.23
Average of 20 Locations	**46.45**	**59.62**	**74.05**	**6.34**	**9.40**

Table Five: Targeted Spot Measured Parameters

It is interesting to note that the difference between the measured RF signal level between the Non-Targeted and Targeted Spot locations is only 0.67 dB on average (the Targeted measurements slightly higher), indicating the measurement locations were positioned soundly for both measurements. Not surprisingly, the MPX and Multipath ratio was 11% and 22% higher, respectively, for the Targeted measurements. Much of this can be attributed to the SLC-PROVO3, SLC-PROVO4, and PROVO1 Targeted-Spot measurements where the multipath ratio was considerably higher, presumably due to the different content being received from multiple boosters. Also of note was the pilot carrier stability, which varied only 1.1% for the average of the two measurements.

IV. RF ANALYSIS OF THE TEST AREA

It is important to emphasize that no changes were made to the RF broadcast sites in terms of power, antennas, etc. at the KDUT broadcast stations. Because of the well designed booster placement and the uniqueness of the terrain, it was desired to see if implementing targeted messaging without any RF re-engineering could be successful, which was accomplished successfully as this report indicates.

60 dBu CONTOURS

The Broadcast (Part 73) propagation models are essentially simplified statistical methods of estimating field strength and coverage based only on a station's effective radiated power (ERP) and height above average terrain (HAAT). Since the terrain information is averaged, the model does not take into account specific individual localized obstructions or shadowing. Also, since the average used for this model only includes the terrain between three and 16 kilometers from the transmitter site, terrain obstructions outside of this range are ignored. This means that identical results will be calculated whether or not a transmitting antenna has clear line of sight or complete blockage by an obstruction in the first three kilometers portion of a path. Likewise, any terrain obstructions beyond 16 kilometers that block the line of sight to a more distant receiving antenna are ignored. The main use of this model is for license applications or other submissions to the FCC which specifically require the use of the methods described in Part 73.

Designated as F(50,50) (Estimated field strength exceeded at 50% of the potential receiver locations for at least 50% of the time at a receiving antenna height of 9.1 meters), the protected service contours for FM stations are the 54 dBμV/m for commercial Class B stations, 57 dBμV/m for commercial Class B1 stations, and 60 dBμV/m (1 mV/m) for commercial Class A, C3, C2, C1, and C stations, as well as 60 dBμV/m for all classes of noncommercial educational stations (including low power FM (LPFM) stations). City coverage for commercial FM stations is defined by the F(50,50) 70 dBμV/m contour, per Part 73.315. Comparatively, TIREM, Okumura, and Longley-Rice are more analytical models that consider a number of other factors, such as individual obstructions (either terrain or manmade), terrain roughness, Land Use Land Clutter (LULC) information, etc.

The 60 dBu contours for the KDUT stations, along with the test locations, are presented in the four distinct geographical test areas. These plots, along with the Longley-Rice RF prediction plots, were generated with the V-Soft Probe 4 Professional software.

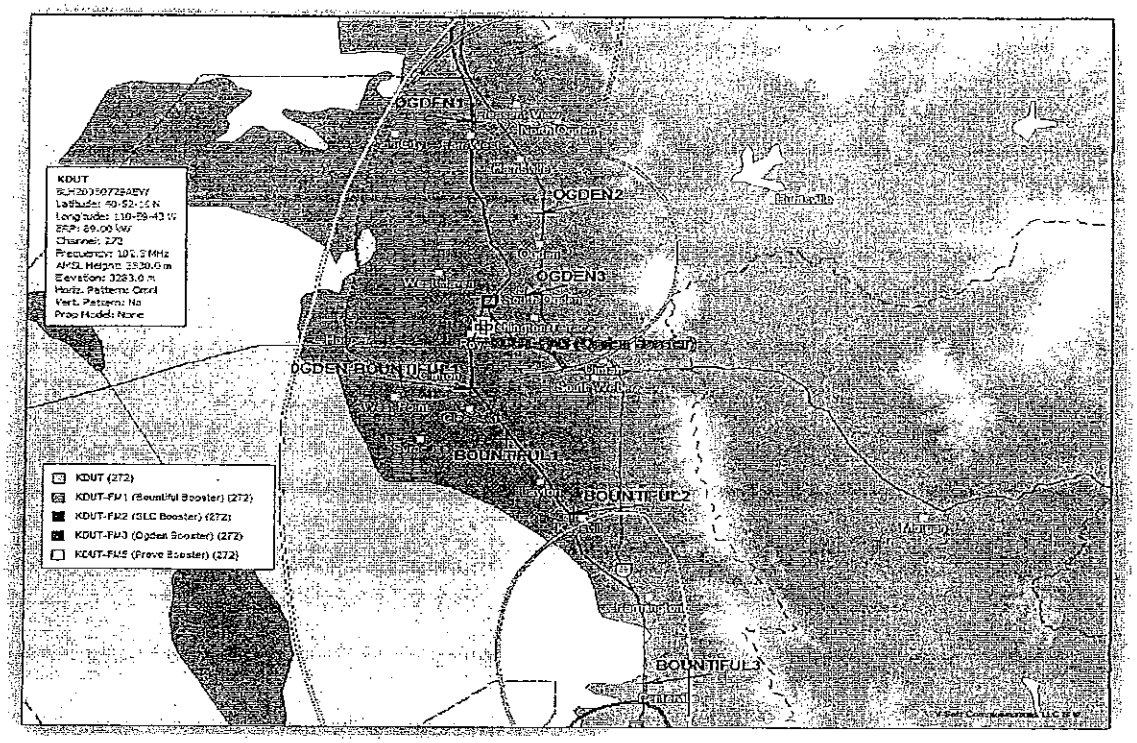

Figure 11: Ogden Area Contour and Test Locations

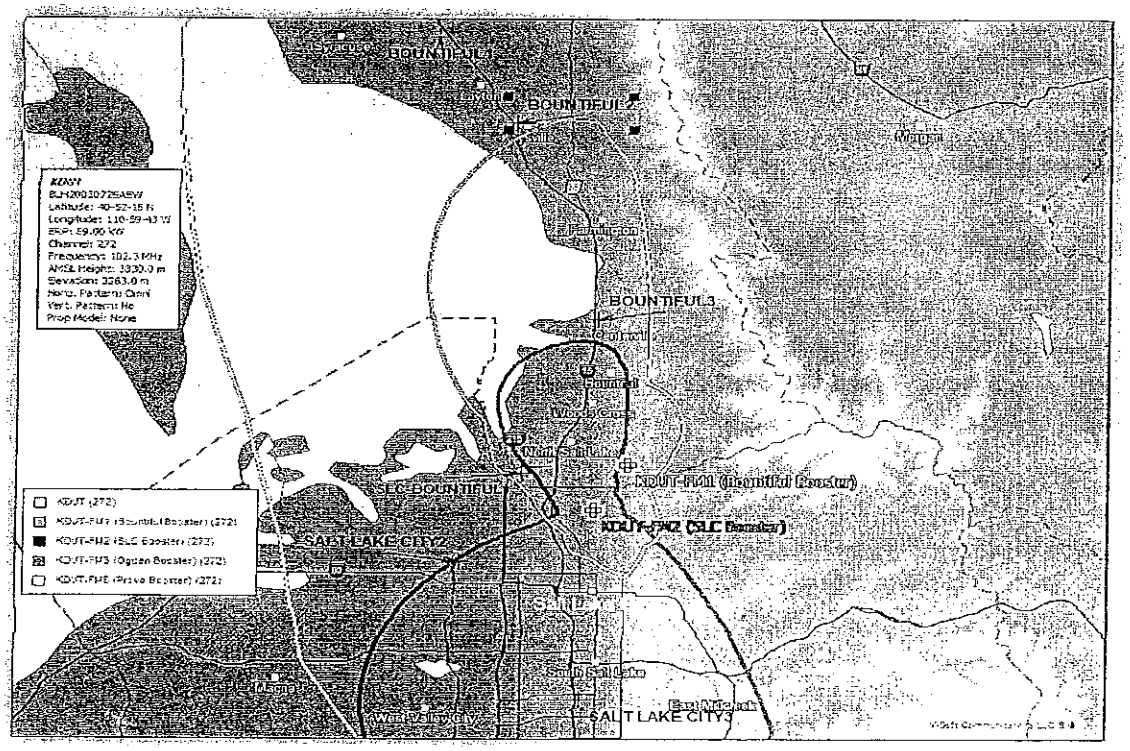

Figure 12: Bountiful Area Contour and Test Locations

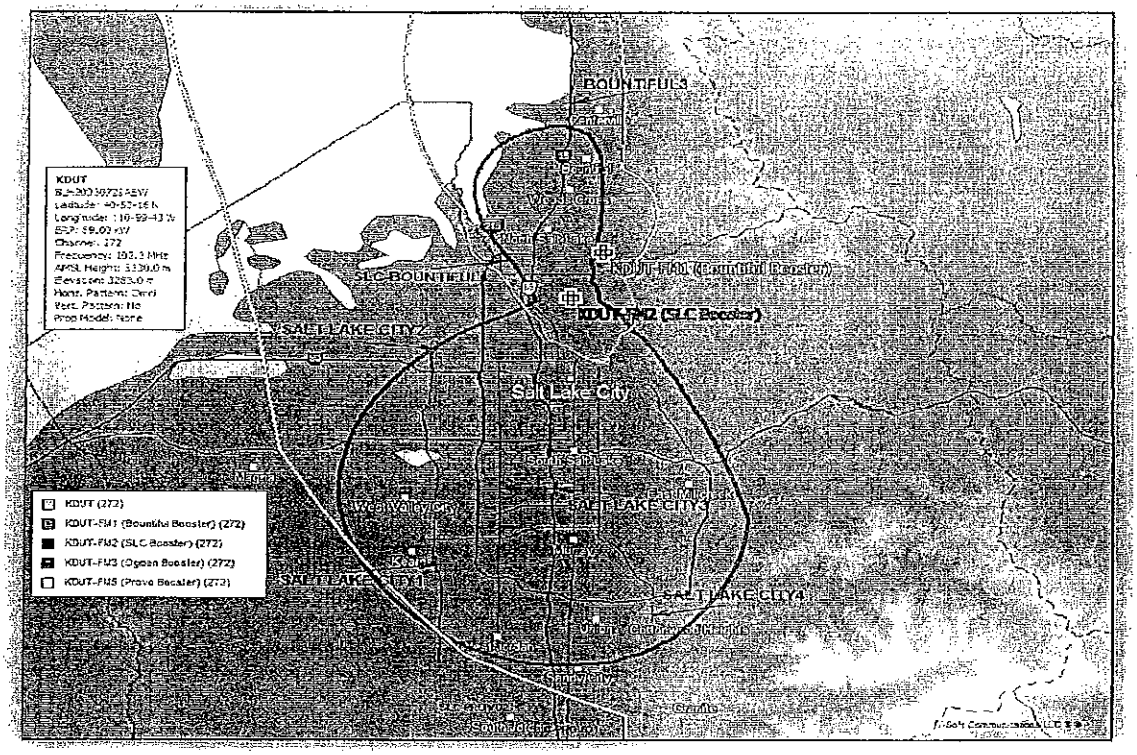

Figure 13: Salt Lake City Area Contour and Test Locations

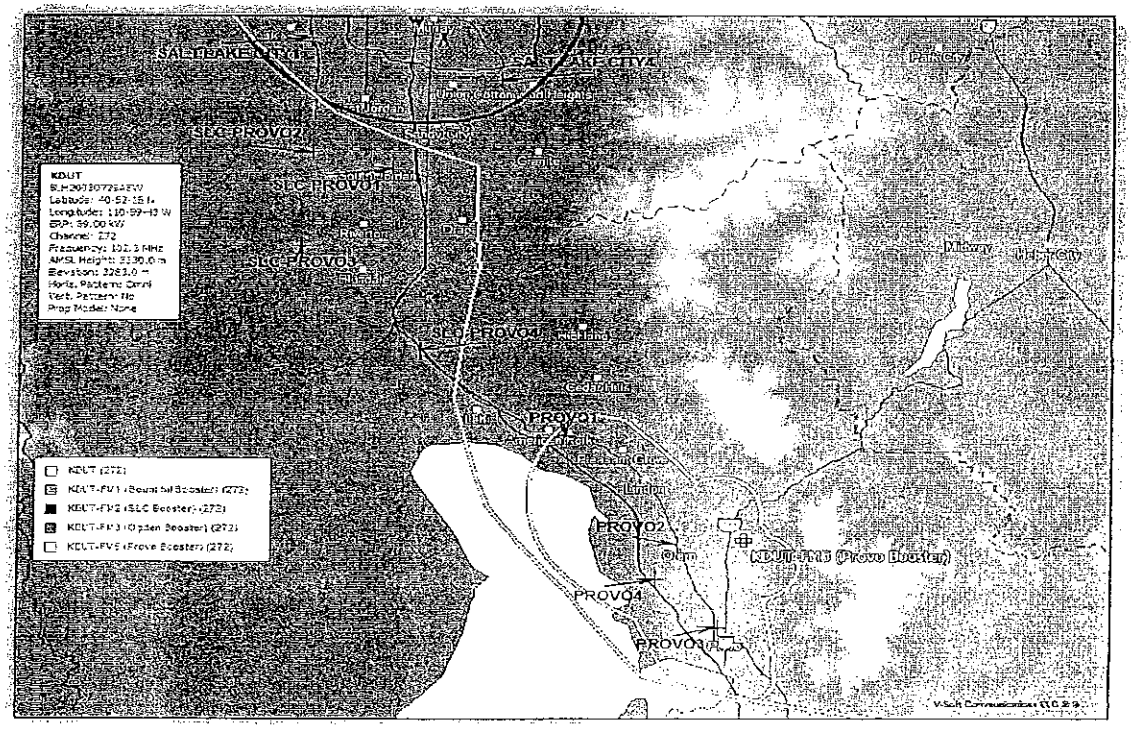

Figure 14: Provo Area Contour and Test Locations

LONGLEY-RICE RF COVERAGE AND D/U PREDICTIONS

It is helpful to illustrate the four distinct market segregations from a RF propagation examination. Therefore, a Longley-Rice prediction of the coverage of the main and four booster locations is used, at a height of the measurement antenna on the measurement vehicle (1.8 meters) and a cutoff field strength of 40 dBμV/m.

In addition to the RF coverage prediction, Desired-to-Undesired ratios were calculated for each of the 20 test locations, as this assists in the evaluation of possible interference that may exist.

	Targeted Tests		Non-Targeted Tests			
	Absolute field : dBμV	Relative field : dBμV/m	Absolute field : dBμV	Relative field : dBμV/m	Average Quality	D/U Ratio dB
OGDEN-BOUNTIFUL1	39.61	52.78	38.29	51.46	3.66	7.76
OGDEN1	44.09	57.26	41.71	54.88	3.87	26.72
OGDEN2	51.36	64.53	53.15	66.32	4.50	35.48
OGDEN3	62.70	75.87	60.71	73.88	4.50	50.73
BOUNTIFUL1	39.04	52.21	37.11	50.28	3.77	11.33
BOUNTIFUL2	36.95	50.12	38.01	51.18	3.96	11.82
BOUNTIFUL3	56.34	69.51	56.08	69.25	3.92	26.11
SLC-BOUNTIFUL1	57.16	70.33	55.18	68.35	4.07	4.38
SALT LAKE CITY1	53.03	66.20	51.04	64.21	4.50	19.28
SALT LAKE CITY2	48.58	61.74	48.74	61.91	4.50	7.88
SALT LAKE CITY3[1]	60.20	73.36	52.83	66.00	4.50	19.71
SALT LAKE CITY4[2]	39.09	52.26	43.35	56.52	4.32	29.71
SLC-PROVO1	34.37	47.54	29.64	42.81	4.19	27.61
SLC-PROVO2	44.06	57.23	47.34	60.51	4.50	15.09
SLC-PROVO3	36.97	50.14	34.77	47.94	3.69	18.53
SLC-PROVO4	28.83	42.00	29.09	42.26	3.49	39.74
PROVO1	49.46	62.63	49.84	63.01	4.43	35.96
PROVO2	59.73	72.90	59.73	72.90	4.50	42.48
PROVO3	46.02	59.19	46.49	59.65	4.50	36.72
PROVO4	41.39	54.56	41.62	54.79	4.50	25.11
Average of 20 Locations	46.45	59.62	45.74	58.91	4.19	24.61

Table Six: Desired-to-Undesired Ratios

From observation of the above table, it can be seen the D/U ratio varies from a low of 4.38 dB (SLC-BOUNTIFUL1, where there is significant simulcast overlap) to a high of 50.73 dB (OGDEN3, where the measurement location is very close to the Ogden booster). Two other notes of interest, locations SALT LAKE CITY3 and SALT LAKE CITY4 had a difference in measured signal levels of 7.37 dB and 4.26 dB respectively, two of the highest differences in the test. These two measurement locations are different than the typical measurement location in that the parking lots were smaller, and other cars passing by in close proximity during the spot recording occurred, which could explain the larger difference in signal level. Overall the average D/U ratio is a healthy 24.61 dB, again illustrating the combination of good booster placement and significant terrain blockage isolation.

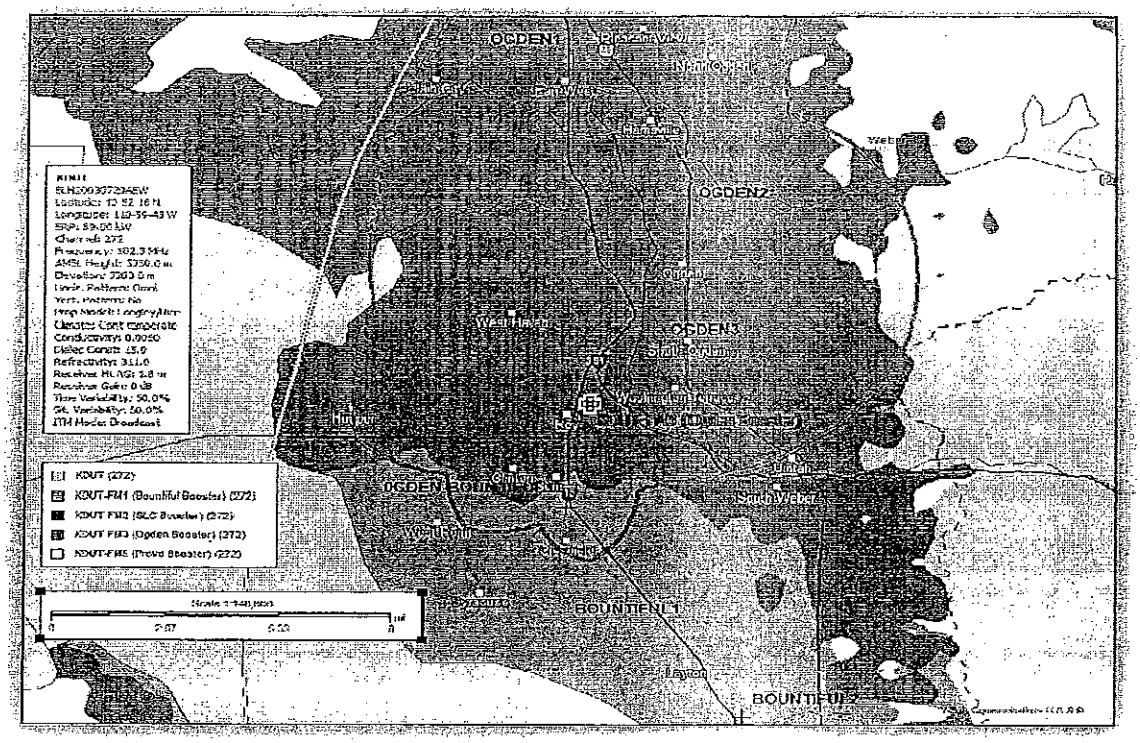

Figure 15: Ogden Longley-Rice Coverage Area

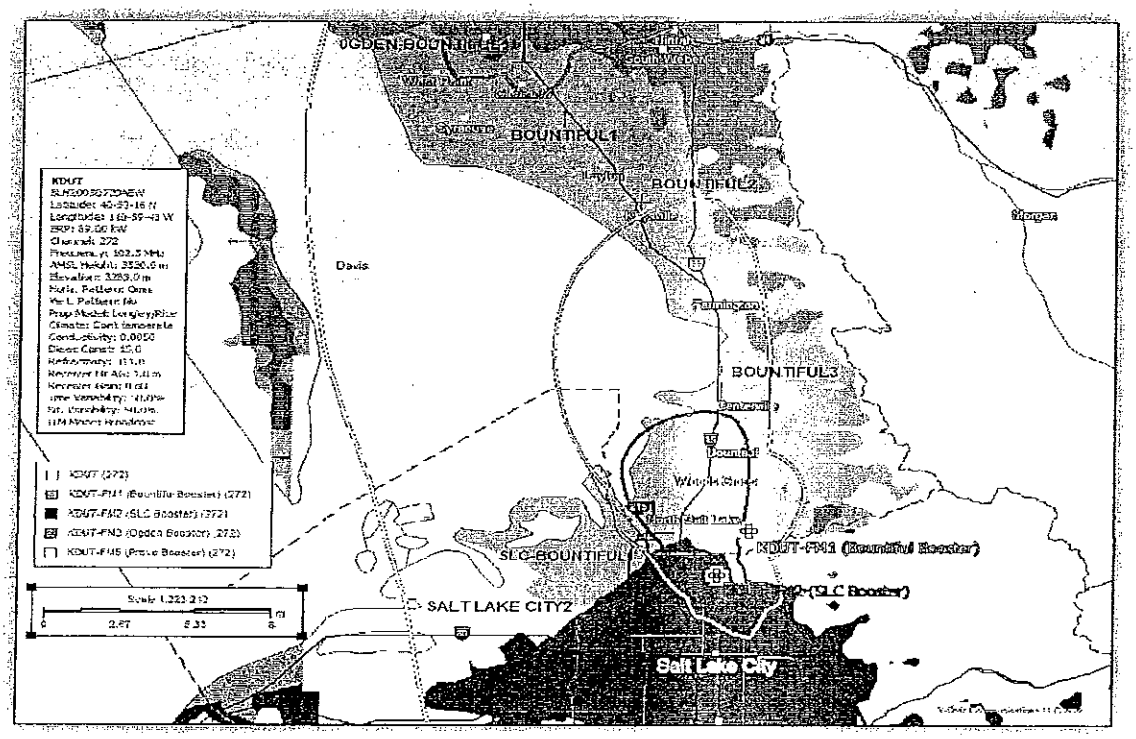

Figure 16: Bountiful Longley-Rice Coverage Area

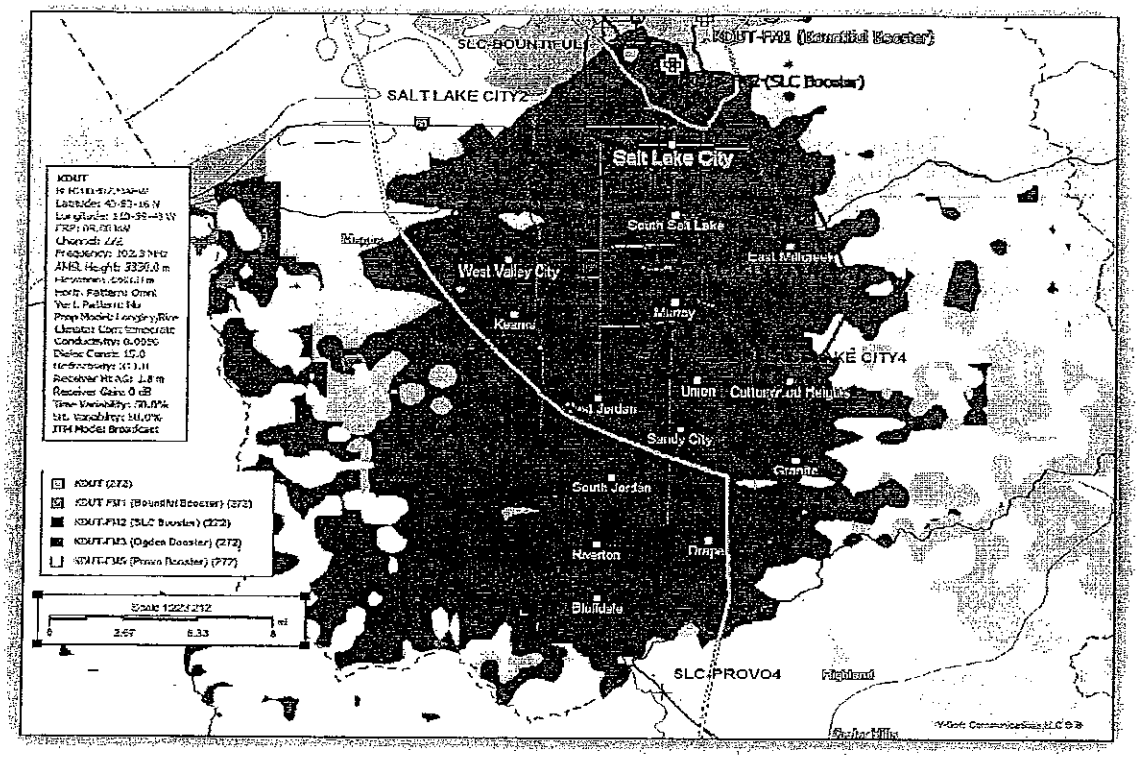

Figure 17: Salt Lake City Longley-Rice Coverage Area

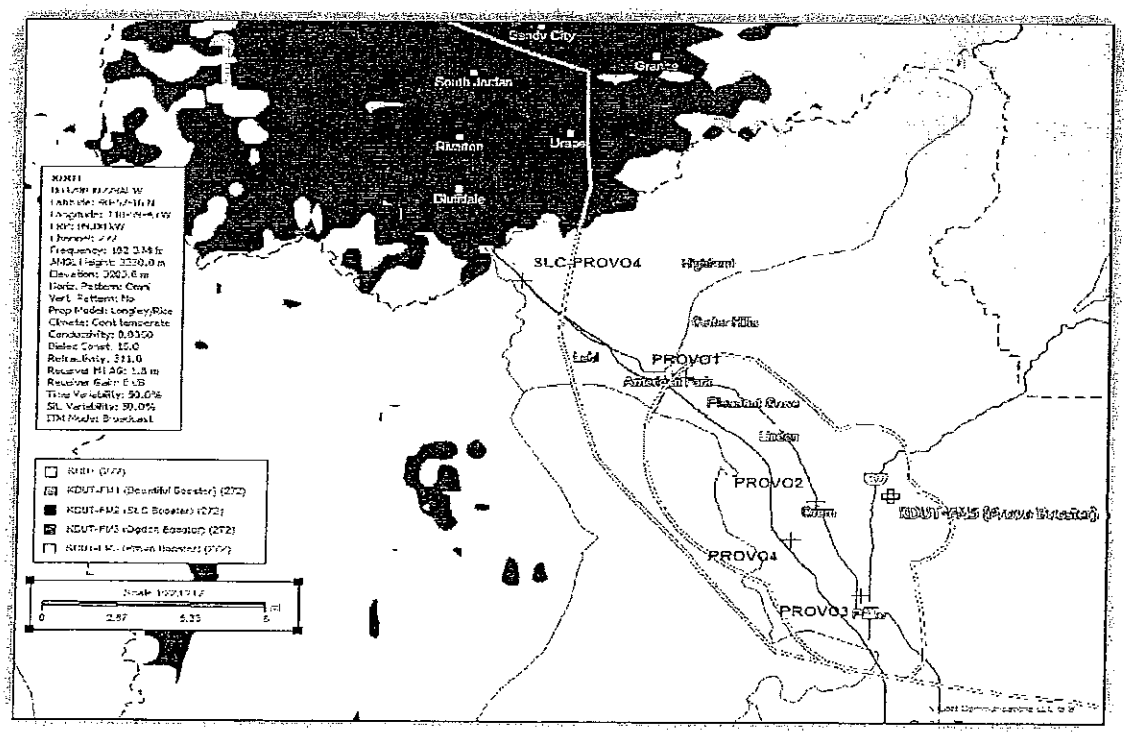

Figure 18: Provo Longley-Rice Coverage Area

V. NETWORK INFRASTRUCTURE AND TARGETED SPOT INSERTION

WiMAX OVERLAY AND DISTRIBUTION NETWORK

Because no change was made to the existing KDUT(FM) studio-to-transmitter (STL) distribution network, a method of sending distinct audio messages to several of the boosters was needed during the Targeted PSA spot times. This was accomplished by constructing a separate WiMAX wireless distribution network from the KDUT(FM) studio to the Salt Lake City booster and to the Ogden booster. This provided for independent distribution of different targeted audio messages on overlapping boosters during the Targeted messaging spot times. In actuality, it was not feasible to make a change to the existing STL distribution (shown below) as the version of Harris Synchrocast™ was at least 7 years old and non-IP based, and with limited bandwidth (typically a T1) there was not excess capacity to add additional audio streams with control information to indicate to the broadcast transmitter to switch audio sources during the Targeted spot times.

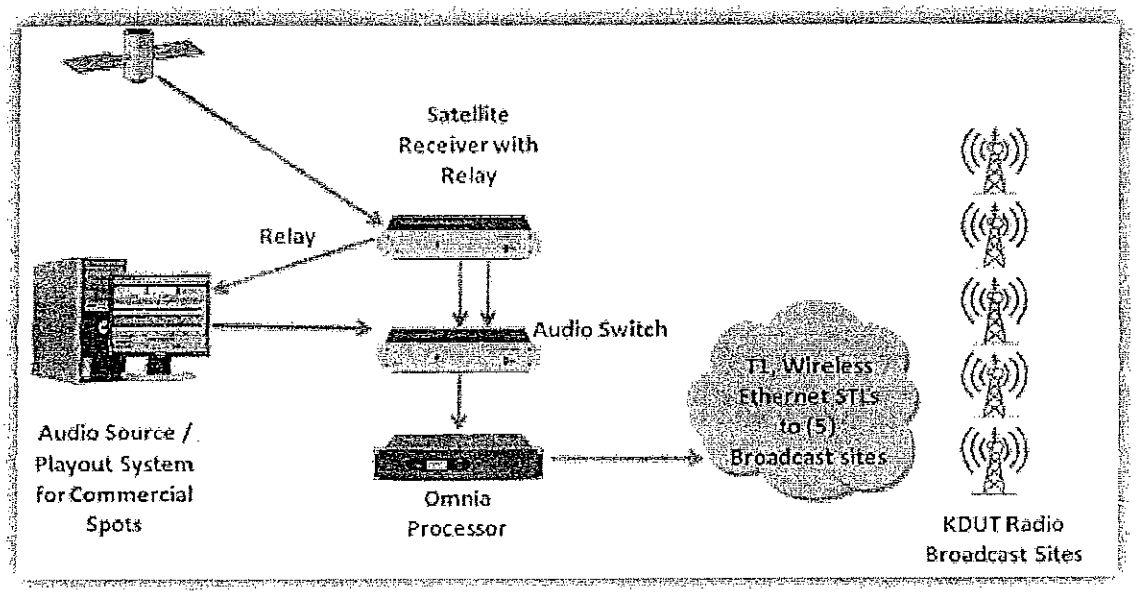

Figure 19: Current Audio and STL Distribution Network

THE LAZER SPOTS™ 'DBH CONTROL UNIT' (Patent Pending)

The Lazer Spots™ 'DBH Control Unit' is defined as a proprietary implementation of hardware and software that typically resides at the broadcast studio. The 'DBH Control Unit' design directs different audio feeds from new and existing automation and playout equipment (such as RCS -Prophet Systems, ENCO Systems, AudioVault-Broadcast Electronics, Scott Studios, Computer Concepts -Maestro, BSI Simian, WideOrbit- former Google automation, OMT Technologies –iMediatouch and others), through the 'DBH Control Unit' to different transmitter sites, while simultaneously turning the transmitters on and off (and/or increasing and decreasing the transmitters power) in synchronization with the new audio targeted audio feeds.

The 'DBH Control Unit' design is based on Ethernet, a mature technology which is the clear direction for audio routing. The major components use equipment which is 100% compatible with Ethernet networking standards, including Cisco networking equipment. The same network that switches and distributes live, linear audio targeted channels also carries GPIO signals, file transfers, and any other standard IP data.

The hardware and software that the 'DBH Control Unit' houses includes analog and digital input and output interfaces, General Purpose Input and Output (GPIO) logic interfaces, both trigger (TTL low-level voltage) and contact closure relays connections, routing software which controls consolidated access to all interfaces, and a Cisco Catalyst-Ethernet switch to connect interface nodes, PCs, WAN devices, and an internal playout system thru 10/100/1000 Mbps ports. The 'DBH Control Unit' performs timed updates (or via contact closure or audio detection) to reconfigure a few or many sources and destinations simultaneously. It also can provide the generation of Target spot audio if necessary.

ROUTING, SWITCHING, AND CONTROL FOR TARGETED SPOT DELIVERY

Each implementation of the 'DBH Control Unit' will vary in configuration depending on the broadcast studio audio equipment and STL interfaces. For KDUT(FM), during the Targeted spot time (two to three times per hour), pre-produced 30 second Targeted spot audio streams were generated with a PC running multiple playout system software instances. A relay trigger pulse from the existing on-air playout system to the 'DBH Control Unit' initiated the generation of Targeted audio playout streams. This was done by creating a script command in the existing playout system before each of the Targeted spots to pulse a relay that was connected to a trigger on the 'DBH Control Unit' multiple instance internal playout system. Once the trigger was pulsed, several new audio streams (the pre-produced Target spots) as well as GPIO control information were generated and output to an Ethernet switch/router at the IP network level.

The Ethernet switch/router interfaced directly with a WiMAX overlay distribution network. The WiMAX network connected directly to a wireless router at the Salt Lake City booster transmission site. At this site another wireless connection was made to the Ogden booster transmission site. A high-level architectural diagram of the KDUT(FM) Targeted audio distribution is shown below.

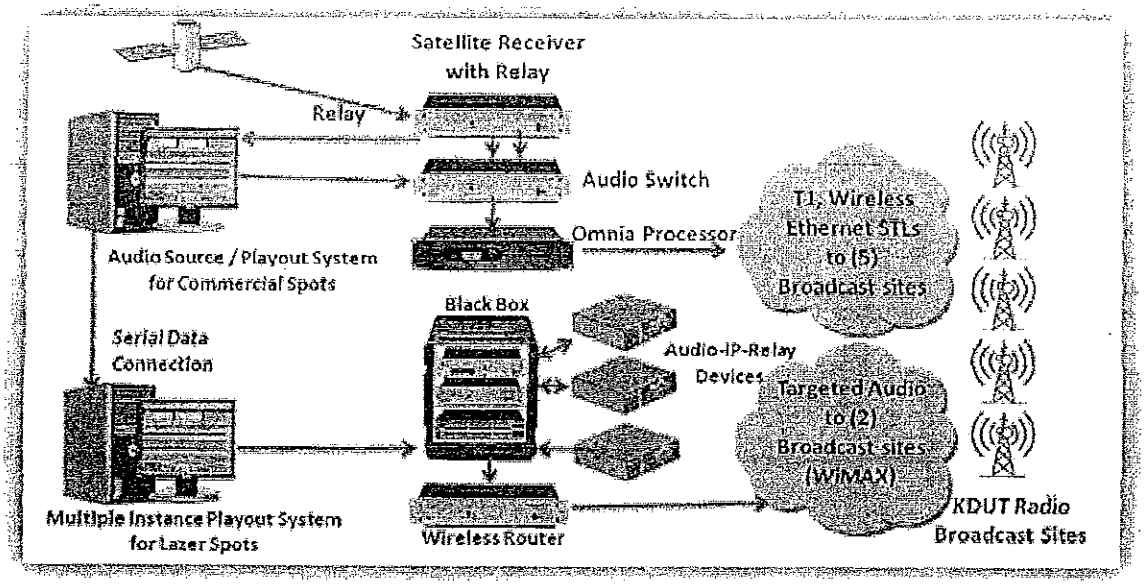

Figure 20: Target Spot Audio and STL Distribution Network

At the WiMAX connected booster sites, an audio switch controlled the digital audio from the current Harris Synchrocast™ stream and the new Targeted digital audio stream by using the GPIO signals generated at the 'DBH Control Unit'. This approach worked very well as the existing broadcast distribution system was not designed to perform this targeting messaging approach. There was one minor issue with the audio at these booster sites such that during the switch of audio sources there is a very brief but noticeable dropout of the broadcast RF signal. It is believed this may be due to the Harris Synchrocast™ system trying to resynchronize the new digital AES audio stream. It is important to note that if this concept were deployed in a non-test full time broadcast environment, a solution to prevent this would be implemented. The solution would be dependent on the new STL distribution network architecture for Targeted spot messaging. A high-level architectural diagram of the implemented KDUT(FM) Target audio test distribution is shown below.

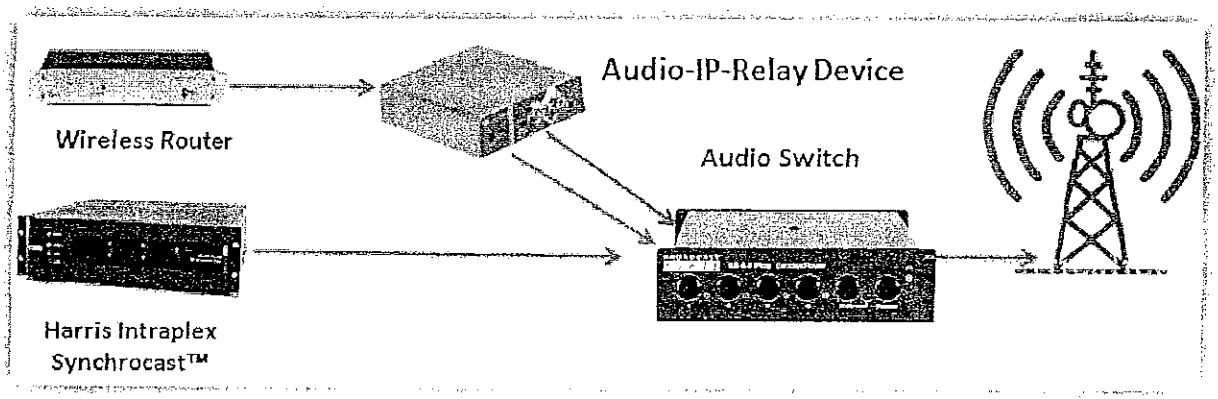

Figure 21: Targeted Spot Booster Site Implementation

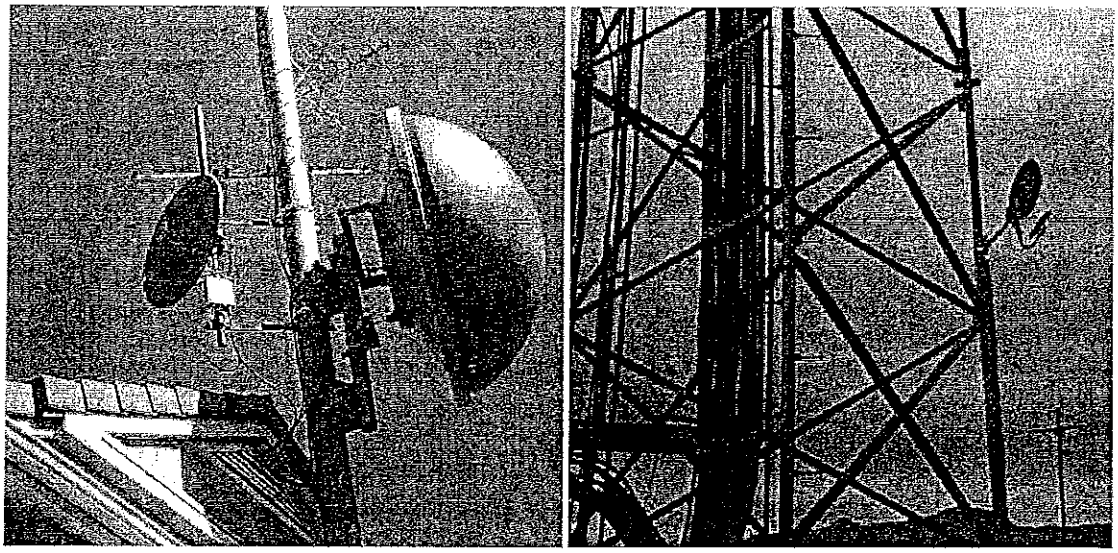

Figure 22: WiMax Overlay Distribution Studio-to-Booster Site Equipment

VI. ANALYSIS AND RATING OF THE AUDIO AND EFFECTIVENESS OF TARGETED SPOT DELIVERY WITH BOOSTERS

AUDIO SAMPLE RECORDINGS

In the KDUT(FM) service contour, the four boosters create four distinct coverage areas, in terms of RF isolation and segregated markets. Distinct Public Service Announcements (PSAs) were tested as each market area was playing a different PSA spot at the same time. For KDUT(FM), radio spots (non-commercial and commercial) start at :26, :42, and :56 minutes of each hour, and the main program is a syndicated feed (La Gran D 102.3 FM, a Spanish station broadcasting a Mexican music format) from a satellite link originating in Sacramento. The test PSAs were 30 seconds in length each, and occurred 2 to 3 times per hour depending on spot availability.

Preliminary testing occurred on 6/1/2010 to 6/7/2010 to determine appropriate test locations and drive distances between test locations. It is important to mention that 15 minutes or 30 minutes elapsed between spots, so drive distances had to be determined- typically 5-10 miles apart, and compensated by roads, construction delays, and alternate routes for high traffic or accidents. A typical test location was in an empty large parking lot with no close obstructions.

The submitted audio clips were recorded in the field on 6/23/2010 to 6/25/2010. Audio information was collected at 20 geographical locations as described in this report. At each of the 20 test locations, a measurement of the Non-Targeted, normal simulcast audio was made for a single PSA spot. This is referred to as the reference PSA spot and used as a comparative reference to the Targeted spot. For the targeted-test mode, distinct spots were broadcast on each adjacent booster. These spots were not in simulcast synchronization mode, as normally would be the case. The goal was to monitor and analyze the audio at the 20 test locations for quality of reception as compared to the Non-Targeted PSA spot.

At each of the 20 measured locations, each audio file attached with this report has the following format:

- Approximately 85 seconds in length.
- 5 seconds of audio before the Non-Targeted spot, the 30 second Non-Targeted spot, 5 seconds of audio after the Non-Targeted spot.
- 5 seconds of silence.
- 5 seconds of audio before the Targeted spot, the 30 second Targeted spot, 5 seconds of audio after the Targeted spot.

This format allows the listener to easily compare subjectively the Non-Targeted PSA reference spot audio to the Targeted spot audio.

NON TARGETED (SIMULCAST) PSA AUDIO SPOT

As mentioned, at each of the 20 test locations a measurement of the Non-Targeted, normal simulcast audio were made for a single PSA spot. This is referred to as the reference PSA spot. The following is the Non-Targeted Reference 30 second PSA Spot, transcribed to English:

National Foundation For Credit Counseling Inc.(Simulcast on all Boosters)
Ana V/O Dude, that is a pretty picture. You must be very proud.
Carlos V/O Yes, and see you, Peter, and I have only been in this country three years and already have a house.
Ana V/O Yeah, but my job is at risk and we could lose the house.
Carlos V/O We had the same problem, you need to act now.
Announcer V/O For free help in Spanish, call 1-800-682-9832 or visit nopierdastuhogarpunto O-R-G
A public service from the National Foundation for Credit Counseling Inc.

TARGETED (NON-SIMULCAST) PSA AUDIO SPOTS

For the targeted-test mode, distinct spots were broadcast on each adjacent booster. These spots were not in simulcast synchronization mode, as normally would be the case. The goal was to monitor and analyze the audio at the 20 test locations for quality of reception as compared to the non-targeted PSA spot. Each spot is 30 seconds in length and transcribed to English:

Habitat for Humanity's Salt Lake City ReStore (Broadcast on the Ogden Booster)
Cleaning out the garage? Have unused home improvement items? Clean up and help your community all at the same time. The Habitat for Humanity ReStore in Salt Lake City, 1276 South 500 West. Buy supplies, donate supplies or volunteer your time. Brand new doors only $10 or used doors for $5.00. Friday and Saturday, 50% off lawn and garden supplies. Come on in to the habitat restore today! 1276 south 500 west.

Utah Hispanic Chamber of Commerce (Broadcast on the SLC Booster)
The Utah Hispanic Chamber of Commerce is a net of companies, associations and entrepreneurs that promote the economic growth in the state. The Chamber promotes its members: leadership,

opportunities to grow, professional growth and community participation. Show off your business at our events increase your contacts, better your operation, find your next partner or client, and meet important people in the community and prominent businessmen. For more information contact us at 801-532-3308 or visit hcc.com. We invite you to become a member of the Utah Hispanic Chamber of Commerce.

Habitat for Humanity's Orem ReStore (Broadcast on the Bountiful and Provo Booster[2])
Cleaning out the garage? Have unused or barely used home improvement items? Don't trash them; restore them at Habitat for Humanity's new Orem ReStore! If you like building and home improvement supplies at 50 – 75% off come to the new ReStore at 340 South Orem Blvd. in Orem. Buy supplies, donate supplies, or volunteer your time... because all proceeds help build Habitat for Humanity homes! Visit the new ReStore at 340 South Orem Blvd. in Orem.

OBJECTIVE AUDIO ANALYSIS FOR NON-TARGETED/TARGETED SPOTS RESULTS

The measurement receiver and collection software, GoldenEar™ developed by WorldCast Systems.com/Audemat division, is described in other sections. The GoldenEar™ software is meant to provide a numerical method for quantifying a pure subjective concept, which is quality of received FM audio. As the method is a numerical one, it will be applied every time the same way, therefore it is an objective measure, as opposed to having numerous subjects listen and evaluate the audio.

The GoldenEar™ quality algorithm uses measured data to form a quality rating, ranging from 1 to 5, 5 being the best and 1 being the worst. An indication of the grading scale algorithm is intended to be analogous to ITU-R (BS.1284-1) [3] recommendations. The following five-grade scale is appropriate for the assessment of sound quality and impairment for the grading of the KDUT(FM) test audio samples which is specified by the ITU-R recommendations.

Quality		Impairment	
5	Excellent	5	Imperceptible
4	Good	4	Perceptible, but not annoying
3	Fair	3	Slightly annoying
2	Poor	2	Annoying
1	Bad	1	Very annoying

Table Seven: ITU-R Grading Scales

For comparison tests, the following ITU-R comparison scale is based on numerical differences using the above five-grade scales for the purposes of comparing the Non-Targeted PSA reference spot to the Targeted PSA spots.

[2] Due to the distance between Bountiful and Provo, and the multiple extreme terrain blockages between these two boosters, no significantly quantifiable RF interference exits between these two boosters. Because the WiMAX overlay distribution network did not reach these sites, KDUT had to broadcast the same spots as explained in the Network Infrastructure and Targeted Spot Insertion section.

[3] RECOMMENDATION ITU-R BS.1284-1*General methods for the subjective assessment of sound quality

Comparison	
3	Much better
2	Better
1	Slightly better
0	The same
–1	Slightly worse
–2	Worse
–3	Much worse

Table Eight: ITU-R Comparison Scales

As indicated in Table Nine, the Non-Targeted Simulcast PSA spot had an objective quality range of 3.54 to 4.5, with a 20 location average of 4.23. The Targeted PSA spots had an objective quality range of 2.94 to 4.5, with a 20 location average of 4.15. The difference between the two averages is 0.07, with the Non-Targeted result being less than a Slightly Better rating when compared to the Targeted results as indicated in Table Nine.

	Non-Targeted Tests			Targeted Tests		
Test Location	Date	Time	Objective Quality Analysis	Date	Time	Objective Quality Analysis
OGDEN-BOUNTIFUL1	6/23/10	10:56	3.65	6/25/10	10:41	3.68
OGDEN1	6/23/10	11:26	4.13	6/25/10	10:56	3.62
OGDEN2	6/23/10	11:41	4.50	6/25/10	11:26	4.50
OGDEN3	6/23/10	11:56	4.50	6/25/10	11:41	4.50
BOUNTIFUL1	6/24/10	15:26	3.54	6/25/10	12:26	4.00
BOUNTIFUL2	6/24/10	15:41	3.93	6/25/10	12:41	4.00
BOUNTIFUL3	6/24/10	15:56	3.83	6/25/10	12:56	4.00
SLC-BOUNTIFUL1	6/24/10	10:56	4.00	6/25/10	14:56	4.15
SALT LAKE CITY1	6/24/10	9:56	4.50	6/25/10	13:41	4.50
SALT LAKE CITY2	6/24/10	10:26	4.50	6/25/10	14:26	4.50
SALT LAKE CITY3	6/24/10	10:41	4.50	6/25/10	14:41	4.50
SALT LAKE CITY4	6/24/10	11:26	4.50	6/25/10	15:26	4.15
SLC-PROVO1	6/24/10	12:26	4.37	6/25/10	19:26	4.00
SLC-PROVO2	6/24/10	12:41	4.50	6/25/10	19:41	4.50
SLC-PROVO3	6/24/10	12:56	3.71	6/26/10	9:26	3.68
SLC-PROVO4	6/24/10	13:26	4.05	6/26/10	9:41	2.94
PROVO1	6/24/10	13:56	4.50	6/26/10	10:26	4.37
PROVO2	6/24/10	14:26	4.50	6/26/10	10:41	4.50
PROVO3	6/24/10	14:41	4.50	6/26/10	10:56	4.50
PROVO4	6/24/10	14:56	4.50	6/26/10	11:26	4.50
Average of 20 Locations			4.23			4.15

Table Nine: Objective Audio Test Results

Based on the fact that no RF broadcast network design changes were implemented, good correlation between the objective calculation and the subjective audio clips, and the fact that all PSA spots were completely perceptible, it is concluded that the implementation of the Lazer Spots™ Targeted messaging test was shown to be extremely successful- it is believed that it could acceptably be implemented commercially. This comment is confirmed by the KDUT(FM) radio operations staff and feedback from them on the quality of the audio during the Targeted spots.

VII. APPENDIX ONE: AUDEMAT FM-MC4 CALIBRATION DATA

On April 7, 2010 the Audemat FM-MC4™, antenna and RF cable were sent to the Audemat Lab in Paris for calibration. Some of the calibration data is shown below.

ANTENNA CALIBRATION

This window displays antenna response curve to be displayed as well as different loss and gain values to be taken into account for calculating the field level's real value from the raw value supplied by the measuring equipment during station acquisition.

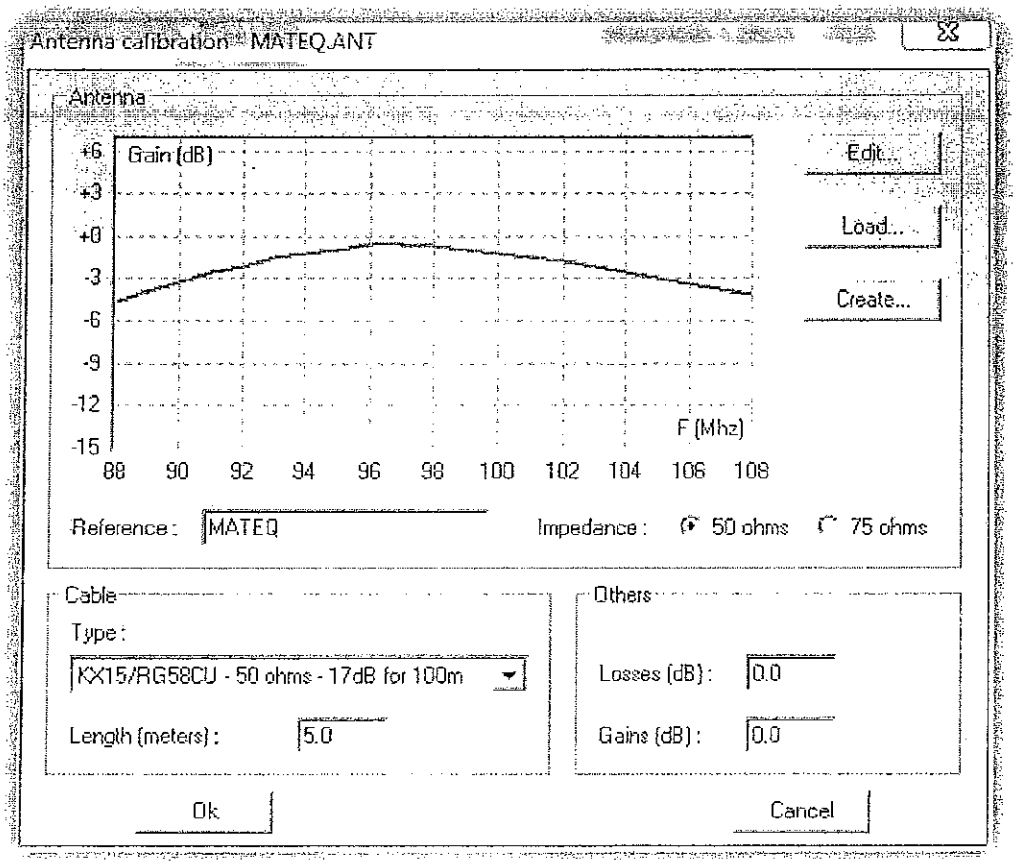

Figure 23: Antenna Calibration Curves

RECEIVER CALIBRATION

This window displays the receiver's response curve of the FM-MC4™ equipment used. The window displays the curves corresponding to different frequencies for which the equipment has been calibrated. These values are in the receiver calibration file which is loaded when the program is launched. This file is supplied with the equipment or when recalibrated in the factory.

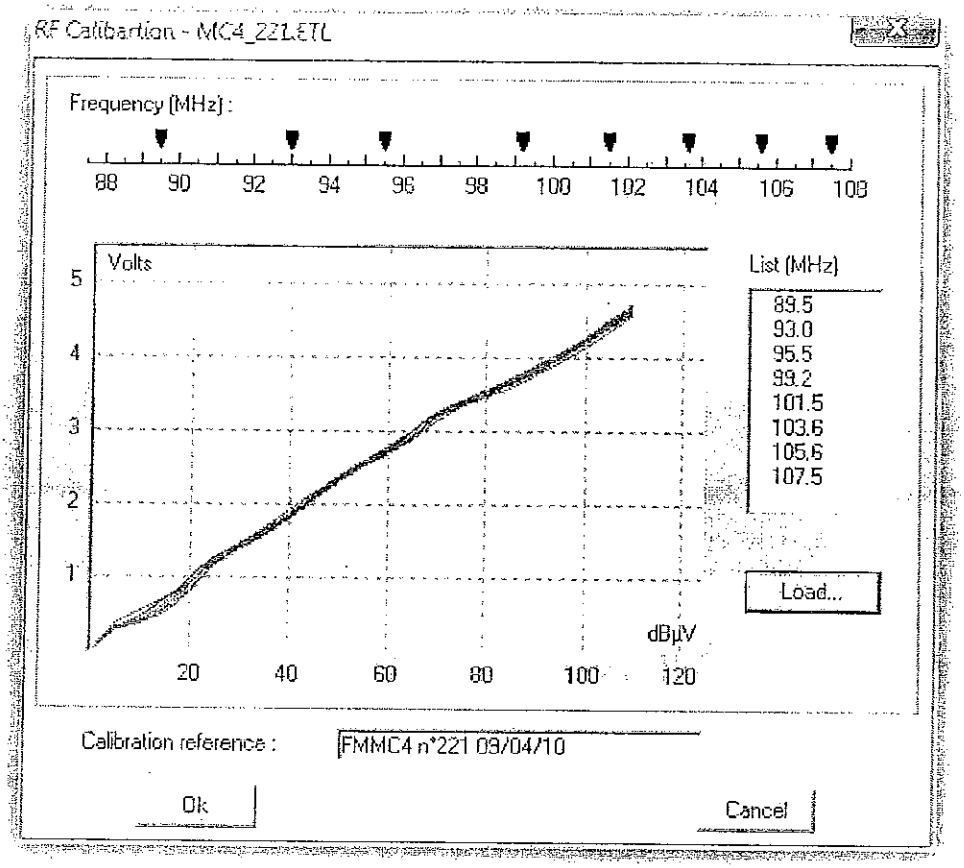

Figure 24: RF Receiver Calibration Curves

VIII. APPENDIX TWO: REFERENCE STANDARDS RELEVANT TO THIS REPORT

FCC AUDIO DIVISION
http://www.fcc.gov/mb/audio/
The Media Bureau licenses commercial and noncommercial educational AM, FM, FM Translator, and FM Booster radio services, and also the noncommercial educational Low Power FM radio service. The Division provides legal analysis of broadcast, technical and engineering radio filings and recommends appropriate disposition of applications, requests for waivers, and other pleadings. Telecommunications falls under **Title 47** of the CFR. AM, FM, and TV broadcast stations fall under **Part 73 and 74** of Title 47.

INTERNATIONAL TELECOMMUNICATIONS UNION (ITU)
ITU Radiocommunication Sector
http://www.itu.int/ITU-R/index.html

ITU-R BS.1114-5: Systems for terrestrial digital sound broadcasting to vehicular, portable and fixed receivers in the frequency range 30-3,000 MHz
ITU-R BS.412-9 17, ANNEX 3: Protection ratio for FM sound broadcasting in the case of the same programme and synchronized signals
ITU-R BS.1387-1: Method for objective measurements of perceived audio quality
ITU-R BS.1284-1 General methods for the subjective assessment of sound quality

WORLDCAST SYSTEMS / AUDEMAT DIVISION MENTION REFERENCES
http://worldcastsystems.com/

CCIR [Recommendation 638] : Terms and definitions used in planning frequencies for audio and television Broadcasting – Protection ratio in Audio Frequency
CCIR [Recommendation 559-2] : Objective measuring of RF protection ratios in broadcasting – parameters taken into consideration
CCIR [Recommendation 559-2] : Objective measuring of RF protection ratios in broadcasting – Standardised noise spectrum – Coloured noise signal used for generator modulation
CCIR [Recommendation 641] : Determining RF protection ratios in audio broadcasting at frequency modulation –Appendix 1 – Maximum deviation of measurement generator frequency
IUT-R [Recommendation BS.450-2] : Transmission standards for audio broadcasting at frequency modulation in metric waves
IUT-R [Recommendation 412-6] : Planning standards for audio broadcasting at frequency modulation in metric waves – Note 4 – Sinusoid signal power
IUT-R [Recommendation 412-7] : Planning standards for audio broadcasting at frequency modulation in metric waves – Appendix 4 – Measuring complete multiplex signal power and peak deviation of an FM audio broadcasting signal
IUT-R [Recommendation 642-1] : Limiters for high quality radio-phonic programme signals AFNOR 97330 :Weighting curve representing average musical messages
CEPT/ERC : [Recommendation ERC 54-01 E] – Method of measuring the maximum frequency deviation of FM Broadcast emissions in the band 87,5 MHz to 108 MHz at monitoring stations
UIT-R [Recommendation 704] : Characteristics of reference receivers in audio broadcasting at frequency modulation, at end of planning
UIT-R [Recommendation 599] : Audio broadcasting reception antenna directivity

ATTACHMENT A

ATTACHMENT B

Shainis & Peltzman, Chartered

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Special Counsel
Stephen C. Leckar
steve@s-plaw.com

January 18, 2012

VIA HAND DELIVERY
Marlene H. Dortch
Secretary
Federal Communications Commission
Portals II – 12th Street Lobby
Filing Counter – TW – A325
445 12th Street SW
Washington, DC 20554

FILED/ACCEPTED

JAN 18 2012

Federal Communications Commission
Office of the Secretary

Re: Cohan Radio Group, Inc.
WWOJ(FM), Avon Park, Florida
Facility ID No. 27199

Dear Ms. Dortch:

On September 28, 2011, Cohan Radio Group, Inc., the licensee of WWOJ(FM), Avon Park, Florida, was granted its Request for Experimental Authorization, which was filed on July 19, 2011 and supplemented on September 22, 2011. Pursuant to the grant of the Experimental Authorization, testing was conducted. Furthermore, as required by the Experimental Authorization, the licensee is submitting the attached report. If there are any questions with respect to this matter, please communicate with the undersigned.

Sincerely yours,

Aaron P. Shainis

Aaron P. Shainis
Counsel for
Cohan Radio Group, Inc.

Enclosure

cc (w/ enc): Norm Miller (via email)

J:\# #CLIENT MATTERS\DEVINE ENTITIES\GCD.BULLET\Cohan Test Repon Cover Letter 011812.doc

STAMP & RETURN

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EXECUTIVE SUMMARY

BACKGROUND FOR TEST AUTHORITY

Cohan Radio Group, Inc. ("Cohan"), requested an Experimental Authorization on July 19, 2011 and supplemented that request on September 22, 2011. Cohan is the licensee of Station WWOJ (FM), Avon Park, Florida. Cohan proposed to conduct experimental tests to determine the feasibility of broadcasting independent, targeted messages on FM Booster stations. Cohan proposed to construct three temporary FM Booster facilities and to broadcast noncommercial announcements on the booster stations while simultaneously broadcasting different programming on the main station. Cohan proposes to use proprietary technology provided by Lazer Spots, LLC, which will allow different announcements to be placed on the boosters in a synchronized time sequence. The implementation of the tests were done by Lazer Spots, LLC under the direction and supervision of Cohen.

On September 28, 2011, the Commission granted the experimental authorization (Attachment B) effective until January 28, 2011. The authorization specified that "within 60 days following completion of the experimental operation authorized herein, BMU shall file a report of the research, experimentation and results with the Commission pursuant to Section 73.1510(d)."

GENERAL DESCRIPTION OF TEST

Conventionally planned FM broadcasting networks consist of transmitters with independent program signals on individual FM radio frequencies as allocated and regulated by the FCC. The allocation of the radio frequency for each transmitter and protected service and interference contours are defined by the FCC in Part 73 of Title 47 and FM Translator and Booster Rules in Part 74. Boosters are defined as transmitters which broadcast within Main station's coverage area (a "fill-in") on the same channel and frequency, and were created to allow FM stations to provide supplementary service to areas in which direct reception of radio service is unsatisfactory due to distance or intervening terrain barriers. Lazer Spots, LLC has developed a system that will allow an FM radio station to divide its signal into segments with the use of proprietary booster system design, audio and control switching, routing, hardware, software and implementation techniques. This new idea would allow the station to run different audio messages, such as Public Service Announcements (PSAs) on different booster transmitters simultaneously, thereby creating additional time capacity for such announcements. Lazer Spots™ holds a patent pending application for "Equipment, System and Methodologies for Segmentation of Listening Area into Sub-Areas Enabling Delivery of Localized Auxiliary Information". The concept of adding FM boosters to an existing FM broadcast station within the protected service area of the main station and specifically designed for targeted messaging is an expertise of Lazer Spots, LLC. It allows the ability to target listeners with more local relevant information as well as free up valuable broadcast messaging time.

In addition to the main WWOJ (FM) broadcast transmitter, 3 booster locations were constructed for the purpose of this test.

MAIN	WWOJ, Avon Park, Florida	27° 30' 39"N, 81° 31' 54" W	10 kW ERP (C3)
BOOSTER #1	Zolfo Springs, Florida	27° 21' 59"N, 81° 47' 52" W	5 kW ERP
BOOSTER #2	Wauchula, Florida	27° 29' 24" N, 81 ° 50' 29" W	5 kW ERP
BOOSTER #3	Frostproof, Florida	27° 42' 41"N, 81° 33' 04" W	3 kW ERP

Table One: Booster Locations

In the WWOJ (FM) FCC defined service contour (60 dBμV/m), the three boosters create two distinct coverage areas, in terms of RF isolation and segregated markets. Distinct Public Service Announcements (PSAs) were tested as each market area was broadcasting a distinct PSA spot at the same time.

The tests as presented in this report were performed in December 2, 2011 to December 20, 2011 of 2011, after construction of the booster transmitters, the booster antenna arrays, the audio microwave distribution network, and modifications to the broadcast playout system were made to implement the targeted messaging concept.

The test market locations covered by the two zones consisted of three boosters, all of which were simulcast together. One zone consisted of two boosters in the Zolfo Springs / Wauchula FL market; the other zone consisted of one booster in the Frostproof, FL market. This test is unique in that it is tested in very flat terrain and used very directional FM antenna arrays. Given the favorable results obtained and presented in this report we believe this is a very significant actuality.

CONCLUSION

The results of the testing, which occurred on December 2, 2011 to December 20, 2011, demonstrate that not only is the concept technically feasible but it is also of great value to the future of terrestrial FM radio broadcasting. Specifically, different announcements were broadcast to separate and discreet listeners concurrently. The quality of the announcements was not impaired to any significant degree. The attached audio clips for each of the measurement locations are provided for subjective verification of these results.

SUMMARY OF TEST RESULTS

Conventionally planned broadcasting networks consist of transmitters with independent program signals and with individual radio frequencies. The allocation of the radio frequency for each transmitter and protected service and interference contours are defined by the FCC in Part 73 of Title 47 and FM Translator and Booster Rules in Part 74. Lazer Spots, LLC has developed a

proprietary (Lazer Spots™) system and technology that will allow a broadcast FM radio station to divide its signal into segments with the use of carefully engineered booster transmission points. This new concept would allow the broadcaster to run different audio messages, such as Public Service Announcements (PSAs) on different booster transmitters simultaneously, thereby creating additional time capacity for such announcements. It allows the ability to target their listeners with more specific (i.e. hyper-local) relevant information, as it increases valuable broadcast messaging time.

The Lazer Spot™ approach is considerably different from the conventional broadcast coverage enhancement-only approach in that the purpose is to broadcast specific Public Service Announcements (PSAs) to a specific geographical area and potentially demographical listening audience, for a limited amount of broadcast time. For example, in this test a 30 second Targeted spot was broadcast, typically 3 times per hour.

It is common for FM analog booster implementations to create some amount of interference. The Lazer Spots™ proprietary system is designed to i) minimize interference in general using its patent pending design technology and software and routing capabilities, and ii) placing the simulcast interference areas that occur where there exists diminutive population counts and demographically determined non-listeners of the specific broadcast station. It is also important to point out that the overall benefit of the targeted messaging approach far outweighs the relatively small interference that occurs with booster implementations, especially when the design is such that it is engineered to minimize this occurrence to the listening public.

In the WWOJ (FM) test, the submitted audio clips were recorded in the field from 12/2/2011 to 12/20/2011. Audio information was collected at 20 geographical locations and described in detail later in this report. At each of the 20 test locations, a measurement of the 'Non-Targeted', normal simulcast audio were made for a single PSA spot. It should be noted that the boosters used in this tested only transmitted RF power during the simulcast PSA spots, targeted and non-targeted, as normal operation of the station did not utilize boosters. For the Non-Targeted simulcast audio, the same PSA audio spot was broadcast that the main station WWOJ (FM) was broadcasting; 21 different PSA spots were broadcast in rotation in this manner. For the targeted simulcast PSA spot, a single reference PSA spot was simulcast on the boosters during the time that the main WWOJ(FM) transmitter was broadcasting a different PSA spot. This is referred to as the reference PSA 'Targeted' spot. The goal was to monitor and analyze the audio at the 20 test locations for quality of reception as compared to the Non-Targeted PSA spots.

The results in this report indicate an objective 'before and after' analysis of the Non-Targeted and Targeted Audio spots. The audio clips for each of the measurement locations is also provided with this report for subjective analysis, which correlate very well based on listener feedback. In fact, under no case could the Non-Targeted audio be considered imperceptible, as defined in this report under ITU-R definitions. In fact, for the measured tests the average statistical difference between the objective audio quality measurements for the Non-Targeted and Targeted Audio spots are a mere 0.6%. If the guidelines for quality measurements of rounding to the nearest tenth of a decimal were made as suggested by the ITU-R[1], then NO objective

[1] RECOMMENDATION ITU-R BS.1284-1*General methods for the subjective assessment of sound quality

perceptible difference is found on average for the WWOJ (FM) test. This continues on the favorable results of field testing completed by Lazer Spots, LLC.

FIELD TEST PROCEDURE

BOOSTER LOCATIONS

The WWOJ broadcast system has three boosters covering two distinct areas: Zolfo Springs / Wauchula FL and Frostproof, FL. The tests presented in this report were performed occurred on December 2-20 of 2011, after construction of the booster transmitters, the booster antenna arrays, the audio microwave distribution network, and modifications to the broadcast playout system were made to implement the targeted messaging concept.

MAIN	WWOJ, Avon Park, Florida	27° 30' 39"N, 81° 31' 54" W	10 kW ERP (C3)
BOOSTER #1	Zolfo Springs, Florida	27° 21' 59"N, 81° 47' 52" W	5 kW ERP
BOOSTER #2	Wauchula, Florida	27° 29' 24" N, 81 ° 50' 29" W	5 kW ERP
BOOSTER #3	Frostproof, Florida	27° 42' 41"N, 81° 33' 04" W	3 kW ERP

Table Two: Booster Locations

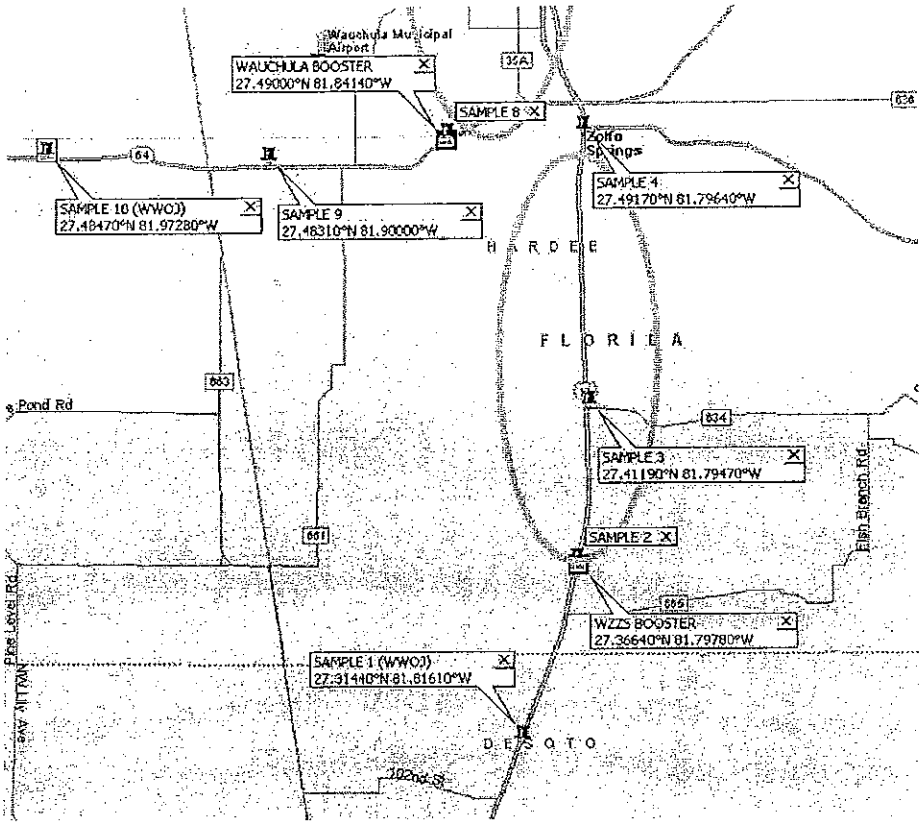


Figure One: Zolfo Spring Booster Test Locations

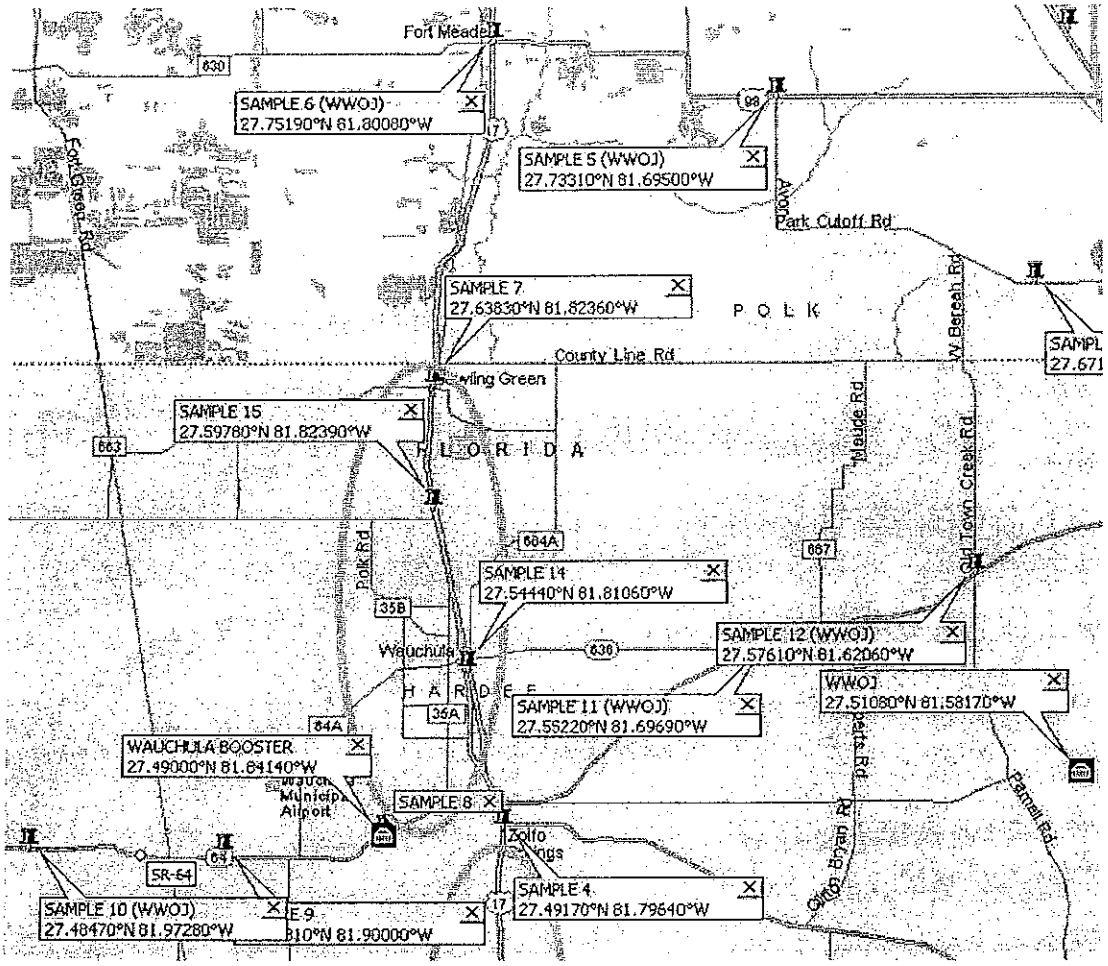


Figure Two: Wauchula Booster Test Locations

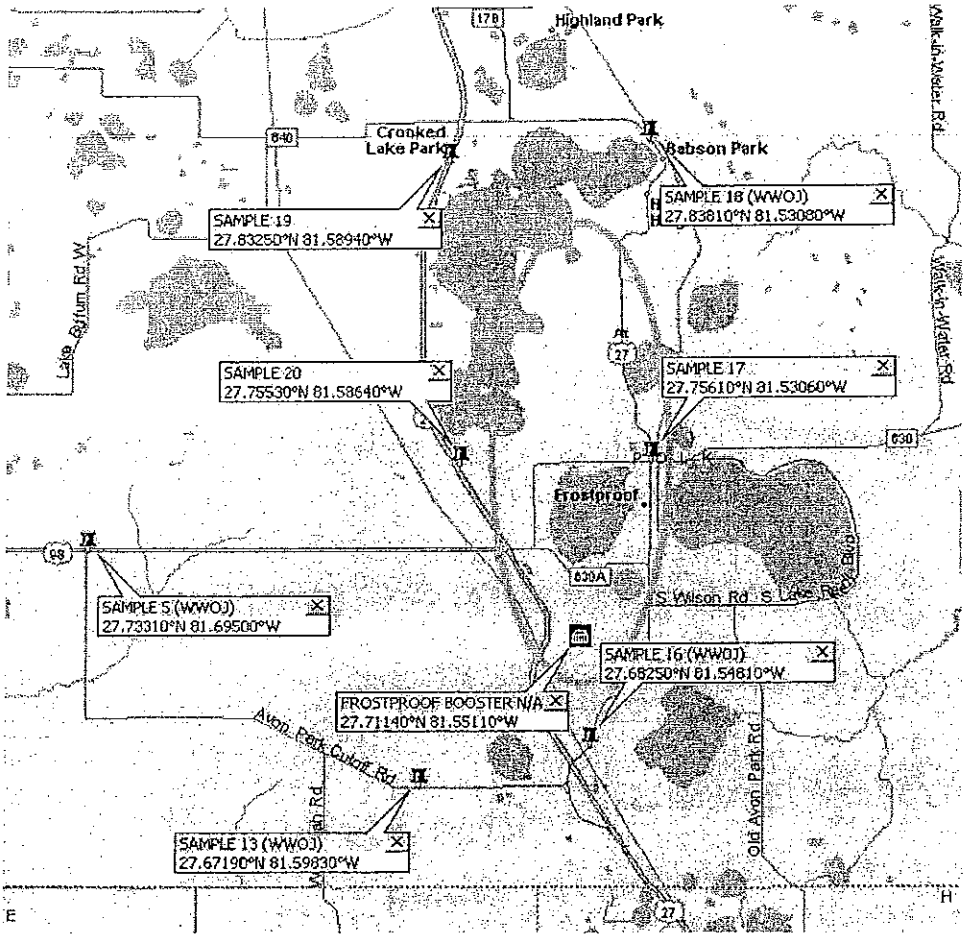


Figure Three: Frostproof Booster Test Locations

DRIVE TEST LOCATIONS

Preliminary testing occurred on 11/15/2011 and 12/01/2011 to determine appropriate test locations and drive distances between test locations. It is important to point out that 10 to 30 minutes elapsed between the PSA spots, so drive distances had to be determined- typically 5-10 miles apart, and compensated by roads, construction delays, and alternate routes for high traffic or accidents. A typical test location was in an empty large parking lot or open field with no close obstructions.

The 20 test locations were made in a stationary vehicle with sophisticated RF receiver and measurement software. Extreme care was taken to measure the Non-Targeted PSA spots and Targeted PSA spot (before and after) while the vehicle was within 1-1.5 meters each time, with the same vehicle orientation, and RF level within 1 dB.

MEASUREMENT LOCATIONS

Each of the 20 test locations was determined both the proximity to the closest booster and the estimated booster coverage zone that it existed. The following table indicates the distances from a test location to the boosters and main (WWOJ) transmitter.

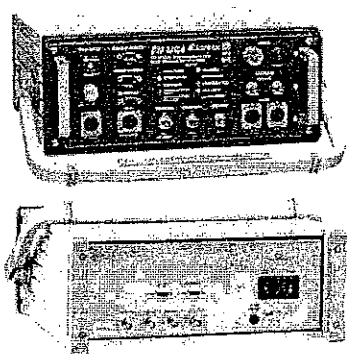
			DISTANCE (MILES) BETWEEN SAMPLE POINTS			
				BOOSTERS		MAIN
	LOCATION		ZOLFO SPRINGS	WAUCHULA	FROSTPROOF	WWOJ
SAMPLE 1	27°18'52"N	81°48'58"W	3.76	12.23	31.88	22.10
SAMPLE 2	27°21'58"N	81°47'53"W	0.00	8.95	28.22	19.13
SAMPLE 3	27°24'42"N	81°47'41"W	3.15	6.11	25.51	17.52
SAMPLE 4	27°29'24"N	81°50'28"W	8.66	2.76	21.35	16.28
SAMPLE 5	27°44'01"N	81°41'42"W	26.11	19.04	8.93	18.33
SAMPLE 6	27°45'07"N	81°48'03"W	26.64	18.27	15.52	23.43
SAMPLE 7	27°38'12"N	81°49'27"W	18.85	10.30	17.42	19.93
SAMPLE 8	27°29'24"N	81°50'28"W	8.95	0.00	23.45	19.04
SAMPLE 9	27°28'59"N	81°54'00"W	10.17	3.63	26.59	22.66
SAMPLE 10	27°29'05"N	81°58'12"W	13.49	8.06	30.20	27.10
SAMPLE 11	27°33'08"N	81°41'49"W	14.25	9.84	14.16	10.52
SAMPLE 12	27°34'34"N	81°37'14"W	18.11	14.78	10.27	7.07
SAMPLE 13	27°38'47"N	81°37'31"W	24.39	19.48	3.97	11.85
SAMPLE 14	27°32'40"N	81°48'38"W	12.32	4.21	19.63	17.25
SAMPLE 15	27°35'52"N	81°49'24"W	16.07	7.52	18.45	18.88
SAMPLE 16	27°40'57"N	81°32'53"W	26.67	22.35	2.00	11.90
SAMPLE 17	27°45'22"N	81°31'50"W	31.51	26.46	3.33	16.95
SAMPLE 18	27°50'17"N	81°31'51"W	36.46	30.65	8.84	22.61
SAMPLE 19	27°49'57"N	81°35'22"W	34.64	28.25	8.69	22.50
SAMPLE 20	27°45'19"N	81°35'11"W	29.83	24.08	3.72	17.22

Table Four: Booster Distance Locations

TEST MEASUREMENT EQUIPMENT AND RESULTS

The Audemat-Aztec FM-MC4™ was used to collect the audio samples in the field. The FM-MC4™ is a professionally calibrated FM receiver with a GPS receiver, and all the measurements are automatically logged. It is an FCC approved calibrated receiver supplied with a calibrated antenna.

GoldenEar™ is a software product which was used with the FM-MC4™ Measurement Receiver. It is intended to evaluate the overall quality of an FM station reception through signal measurements and audio recording.



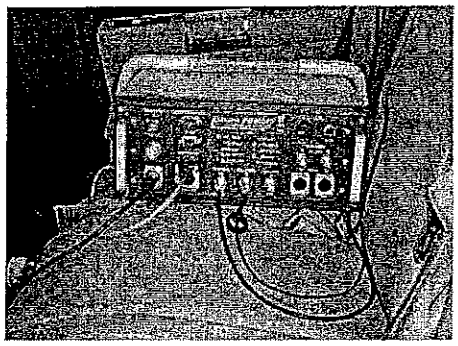


Figure Four and Five: Audemat FM-MC4™

An example of a GoldenEar™ multipath plot is shown for the Sebring WWOJ test locations:

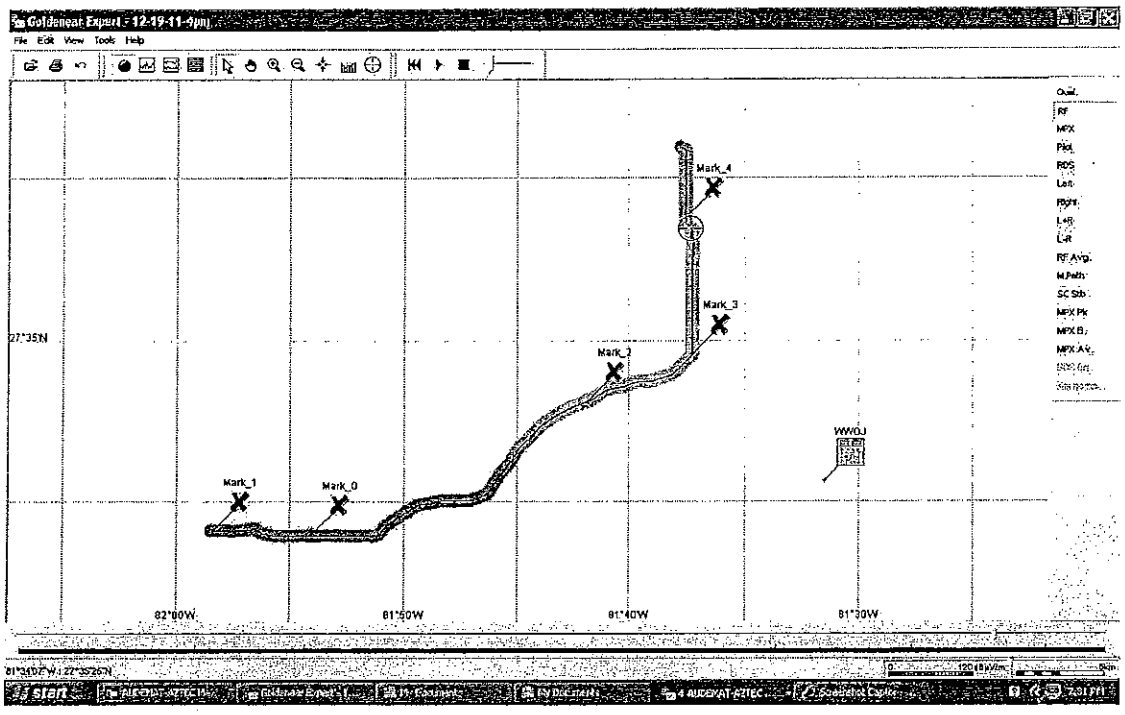


Figure Six: GoldenEar™ SLC Plot

The FM-MC4 enables the following main operations to be carried out on a FM audio signal:

- Quantifying the signal value constituting the Base-band MPX signal
- Quantifying the MPX signal's power value
- Quantifying the demodulated signals' value constituting the audio message
- Ensuring different processing of these quantifications (corrections, averages, statistical calculations, phase, synchronization)
- Ensuring different representations of these quantifications.

The FM-MC4 measurement receiver is also acquires raw data from the FM broadcasting station. These signals are read in digital form through the PC interface. They include:

- RF level
- MPX and sub-carriers (19 kHz Pilot)
- Demodulated audio signals (Left, Right, Left+Right, Left-Right)
- Stereo information.

From these raw signals, several calculated signals are deduced:

- Averaged RF level
- Multipath ratio
- Sub-carrier stability (variation ratio over nominal level)
- MPX exceeding (over nominal level)

The first signal processing is done within the FM-MC4™. The signal concerned by the acquisition is the Multiplex signal whose format is defined by a maximum pass-band of 100 kHz. This analog MPX signal is converted into a digital signal using an A/D converter. Sampling frequency is fixed at 256 kHz, which guarantees quantification of any signal up to theoretical maximum frequency of 128kHz. For subjective listening the audio output of the receiver was recorded digitally in a (CCIT 22.050 kHz, 8-bit, stereo, 43 Kbps sampling rate) WAV file format by the GoldenEar™ software.

In term of RF signal level, the Relative field: dBμV/m, mV/m is presented:

For conversion of the Absolute field (dBμV) into a Relative field (dBμV/m), several calibrated files are supplied with the FM-MC4™, including: K coefficient validation, RF Antenna and

Cable validation, and Loss and Gain validation. Appendix One contains details on these files.

The GoldenEar™ software is meant to provide a numerical method for quantifying a pure subjective concept, which is quality of received FM audio. As the method is a numerical one, it will be applied every time the same way, therefore it is an objective measure, as opposed to having numerous subjects listen and evaluate the audio.

An example graphical output is shown below, indicating RF level (Green), Pilot Stability (Dark Blue), Multipath Ratio (Grey), and L+R (Light Blue), for a portion of a stationary PSA measurement recording.

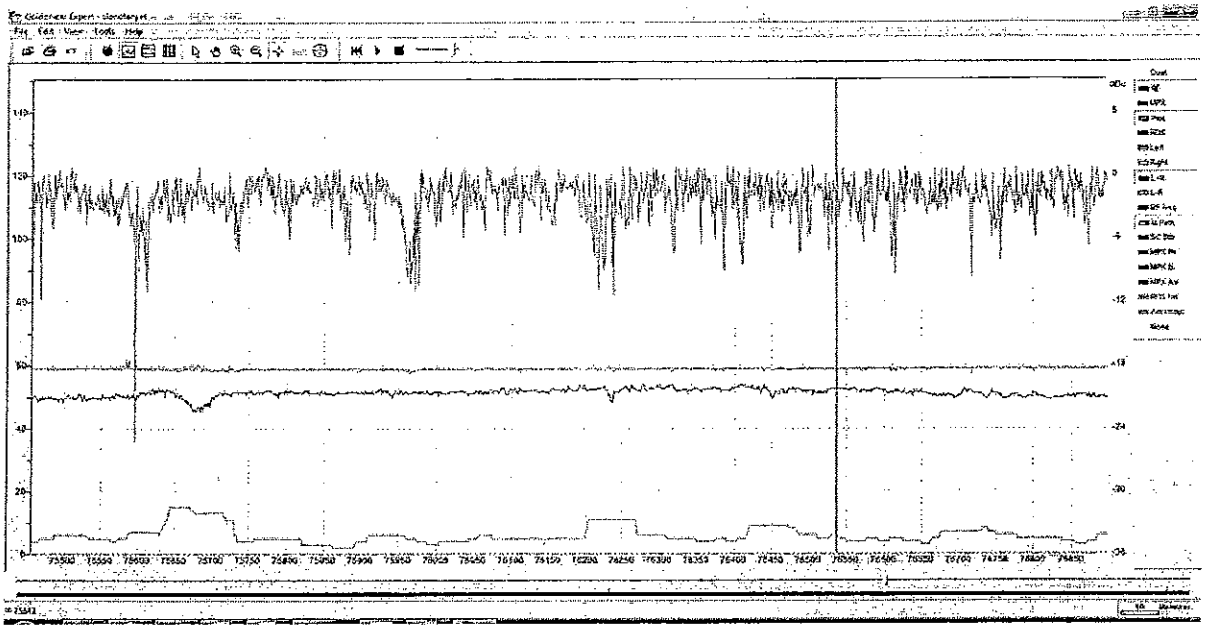


Figure Seven: GoldenEar™ Signal Display

MEASUREMENT VEHICLE

The measurement vehicle used in this test was a 2011 Jeep Liberty AWD. It was chosen because of the very large, flat metal roof with no obstructions, providing a ground plane to minimize pattern disturbances for the magnetic mount whip antenna. It should be noted that the FM-MC4™, antenna and cable were professionally calibrated at Audemat Labs in Paris on 6/18/2010.

Curb Weight (lbs)	4076
City (MPG)	16
Hwy (MPG)	22
Horsepower	210@5200
Torque (lb-ft)	235@4000
Wheelbase	106.1
Length (in.)	176.9
Width (in.)	72.3
Height (in.)	74.0

Figure Eight: Test Vehicle

RF MEASUREMENT RESULTS

The RF propagation of WWOJ (FM) was accurately measured and the data collected was used to tune the RF propagation model. The area of data collection and relative signal strength is indicated in the following figure.

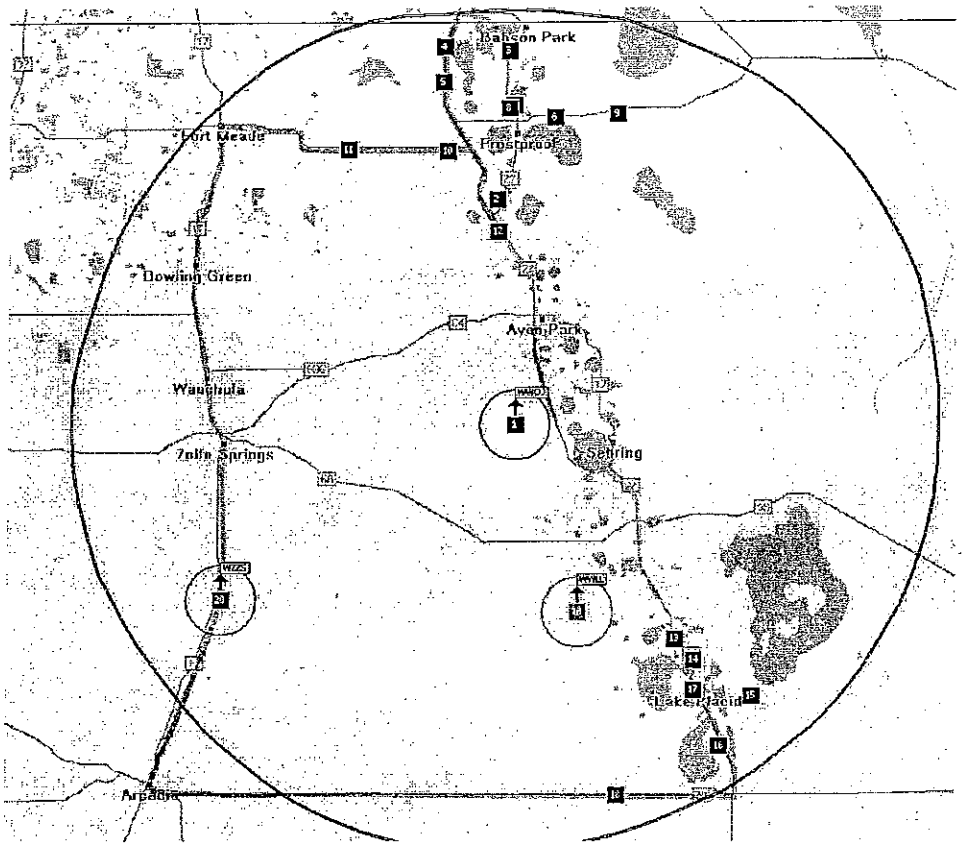


Figure Nine: RF Propagation Measurements for WWOJ

These measurements were imported into the Lazer Spots, LLC propagation model, generally based on the International Standard ITU-R 525/526[2] with sub-path attenuations. Given the flat terrain and minimal amount of obstructions, an accurate model was constructed after only a few correlation analyses which optimized the propagation model parameters:

[2] RECOMMENDATION ITU-R P.525-2 CALCULATION OF FREE-SPACE ATTENUATION (1978-1982-1994), RECOMMENDATION ITU-R P.526-10 Propagation by diffraction (ITU-R 202/3) (1978-1982-1992-1994-1995-1997-1999-2001-2003-2005-2007)

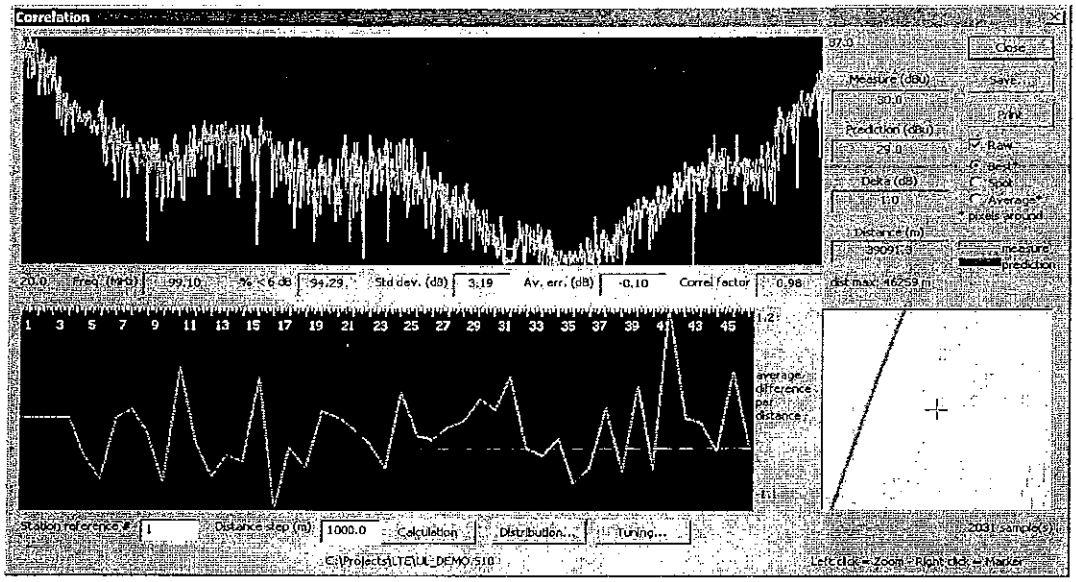


Figure Ten: WWOJ Final Correlation Analysis

The final prediction model had an average error of -0.1 dB and a standard deviation of 3.19 dB, with 94.29% of all samples recorded within a 6 dB window from the mean. This provided a highly accurate model for use in booster design and placement.

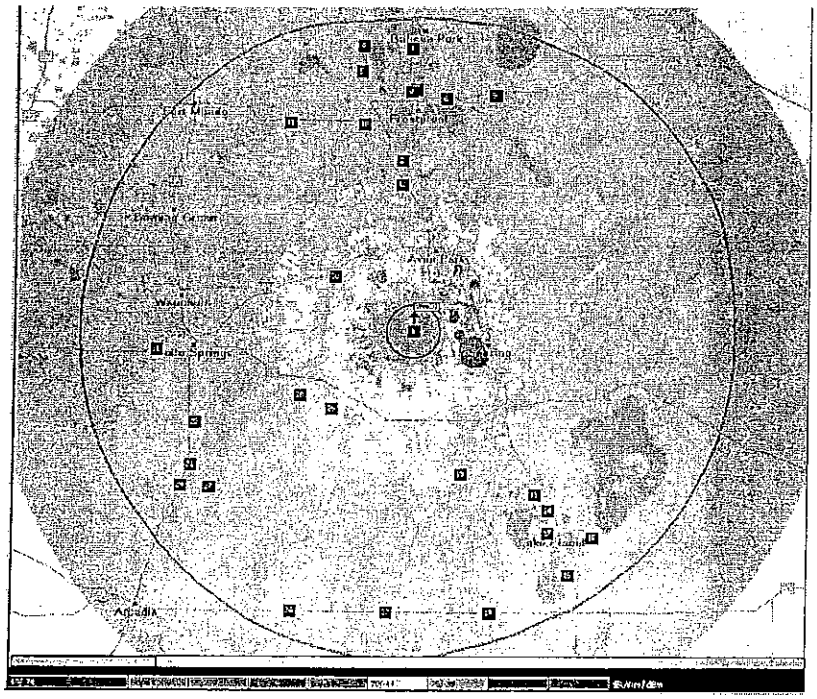


Figure 11: WWOJ Coverage

BOOSTER CONSTRUCTION

Three booster transmitters were constructed for the purposes of this test. All three used Harris ZX TRANSMITTERS™, INTRAPLEX™ and SYNCHROCAST3™ equipment, with a private IP data network for distributing linear uncompressed audio, and GPS for time synchronization and frequency stability.

Figure 12: Outdoor Harris Booster Enclosure

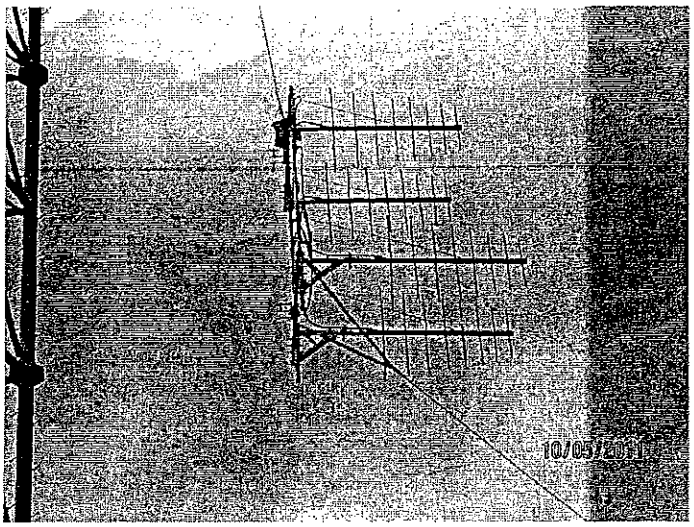


Figure 13: WWOJ FM Booster Antenna Array Being Installed

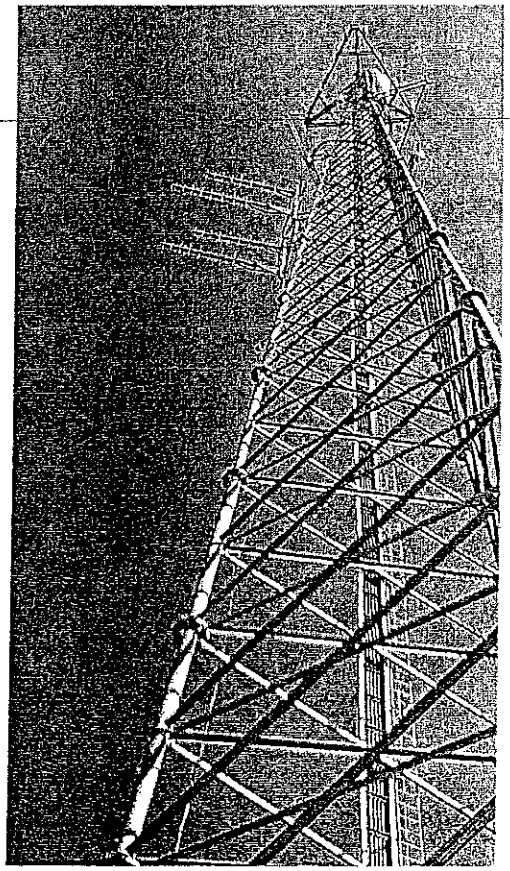


Figure 14: WWOJ Booster Antenna Array on Tower

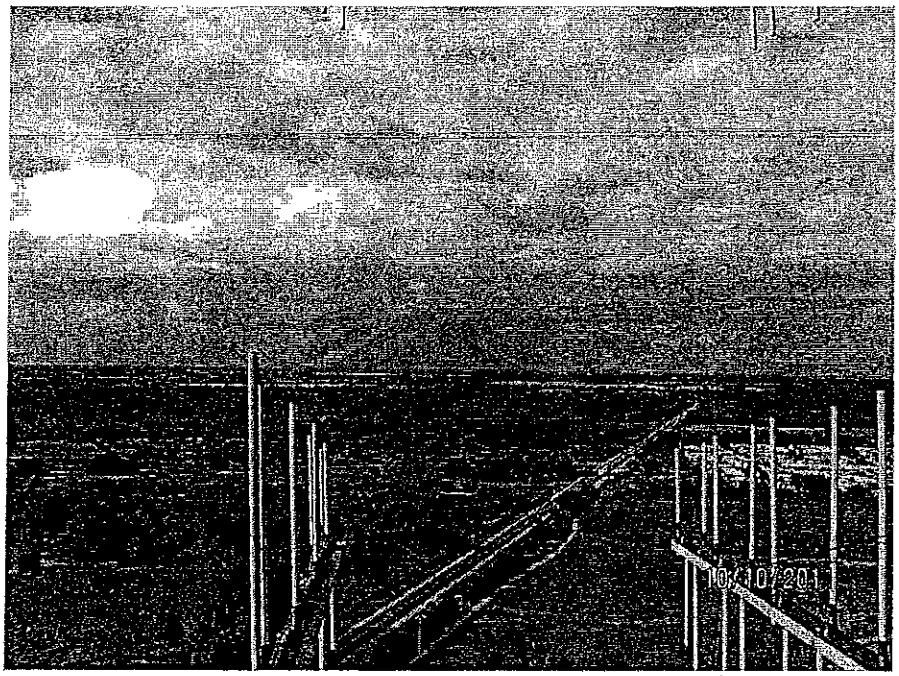


Figure 15: View from Zolfo Springs Booster Antenna Array

BOOSTER DATA

1.	Booster location:	Zolfo Springs, Florida
	Geographic coordinates:	27° 21' 59" N, 81° 47' 52" W (NAD 1927)
	Channel	256 (99.1 MHz)
	Effective radiated power:	Not to exceed 5 kilowatts (Max-DA, V only)
	Antenna type:	Composite array, Four Aldena, model ALP.08.02.712 log periodic antennas, 2 x 2 stack, directional
	Antenna orientation:	0° True
	Antenna height:	
	above ground:	64 meters
	above mean sea level:	81 meters
	above average terrain:	64 meters
2.	Booster location:	Wauchula, Florida
	Geographic coordinates:	27° 29' 24" N, 81° 50' 29" W (NAD 1927)
	Channel	256 (99.1 MHz)
	Effective radiated power:	Not to exceed 5 kilowatts (Max-DA, V only)
	Antenna type:	Composite array, Four Aldena, model ALP.08.02.712 log periodic antennas, 2 x 2 stack, directional
	Antenna orientation:	12° True
	Antenna height:	
	above ground:	72 meters
	above mean sea level:	96 meters
	above average terrain:	72 meters
3.	Booster location:	Frostproof, Florida
	Geographic coordinates:	27° 42' 41" N, 81° 33' 04" W (NAD 1927)
	Channel	256 (99.1 MHz)
	Effective radiated power:	Not to exceed 5 kilowatts (Max-DA, V only)
	Antenna type:	Composite array, Four Aldena, model ALP.08.02.712 log periodic antennas, 2 x 2 stack, directional
	Antenna orientation:	13° True
	Antenna height:	
	above ground:	38 meters
	above mean sea level:	76 meters
	above average terrain:	38 meters

RF ANALYSIS OF THE TEST AREA

Because of the booster placement, optimized for population coverage and flat terrain, it was desired to see if implementing targeted messaging correlated well with the substantial amount of RF engineering performed on this test, which was accomplished successfully as this report indicates.

60 dBu CONTOURS

The Broadcast (Part 73) propagation models are essentially simplified statistical methods of estimating field strength and coverage based only on a station's effective radiated power (ERP) and height above average terrain (HAAT). Since the terrain information is averaged, the model does not take into account specific individual localized obstructions or shadowing. Also, since the average used for this model only includes the terrain between three and 16 kilometers from the transmitter site, terrain obstructions outside of this range are ignored. This means that identical results will be calculated whether or not a transmitting antenna has clear line of sight or complete blockage by an obstruction in the first three kilometers portion of a path. Likewise, any terrain obstructions beyond 16 kilometers that block the line of sight to a more distant receiving antenna are ignored. The main use of this model is for license applications or other submissions to the FCC which specifically require the use of the methods described in Part 73.

Designated as F(50,50) (Estimated field strength exceeded at 50% of the potential receiver locations for at least 50% of the time at a receiving antenna height of 9.1 meters), the protected service contours for FM stations are the 54 dBμV/m for commercial Class B stations, 57 dBμV/m for commercial Class B1 stations, and 60 dBμV/m (1 mV/m) for commercial Class A, C3, C2, C1, and C stations, as well as 60 dBμV/m for all classes of noncommercial educational stations (including low power FM (LPFM) stations). City coverage for commercial FM stations is defined by the F(50,50) 70 dBμV/m contour, per Part 73.315. Comparatively, TIREM, Okumura, and Longley-Rice are more analytical models that consider a number of other factors, such as individual obstructions (either terrain or manmade), terrain roughness, Land Use Land Clutter (LULC) information, etc.

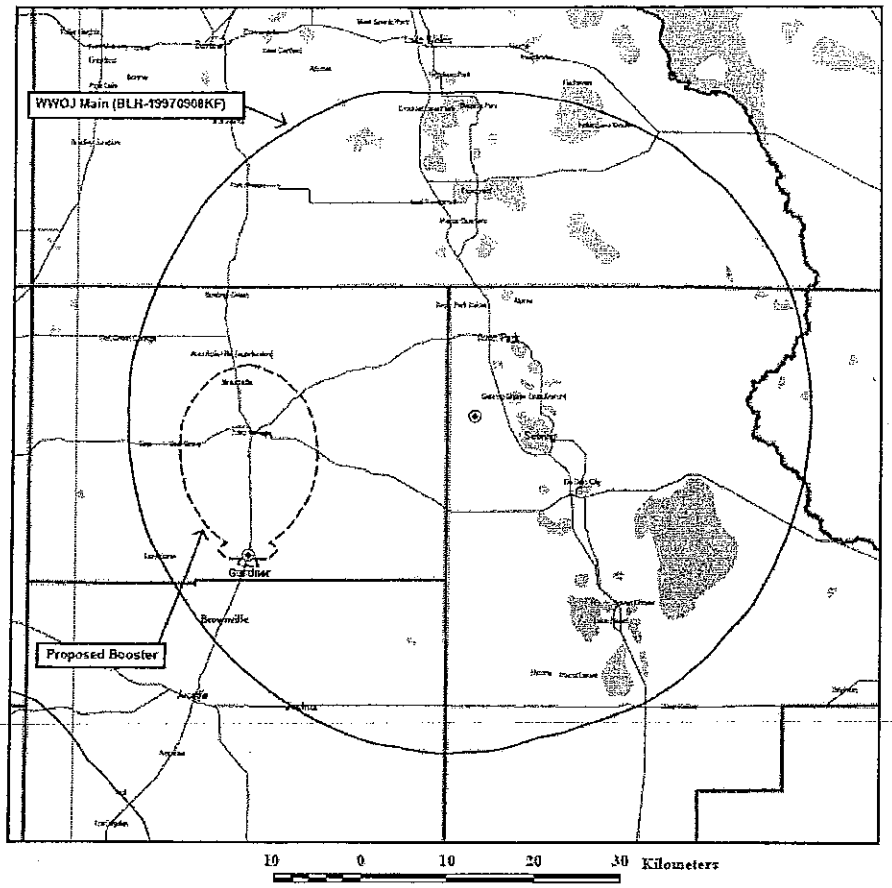


Figure 16: Zolfo Spring Booster 60 dBμV/m Service Contour

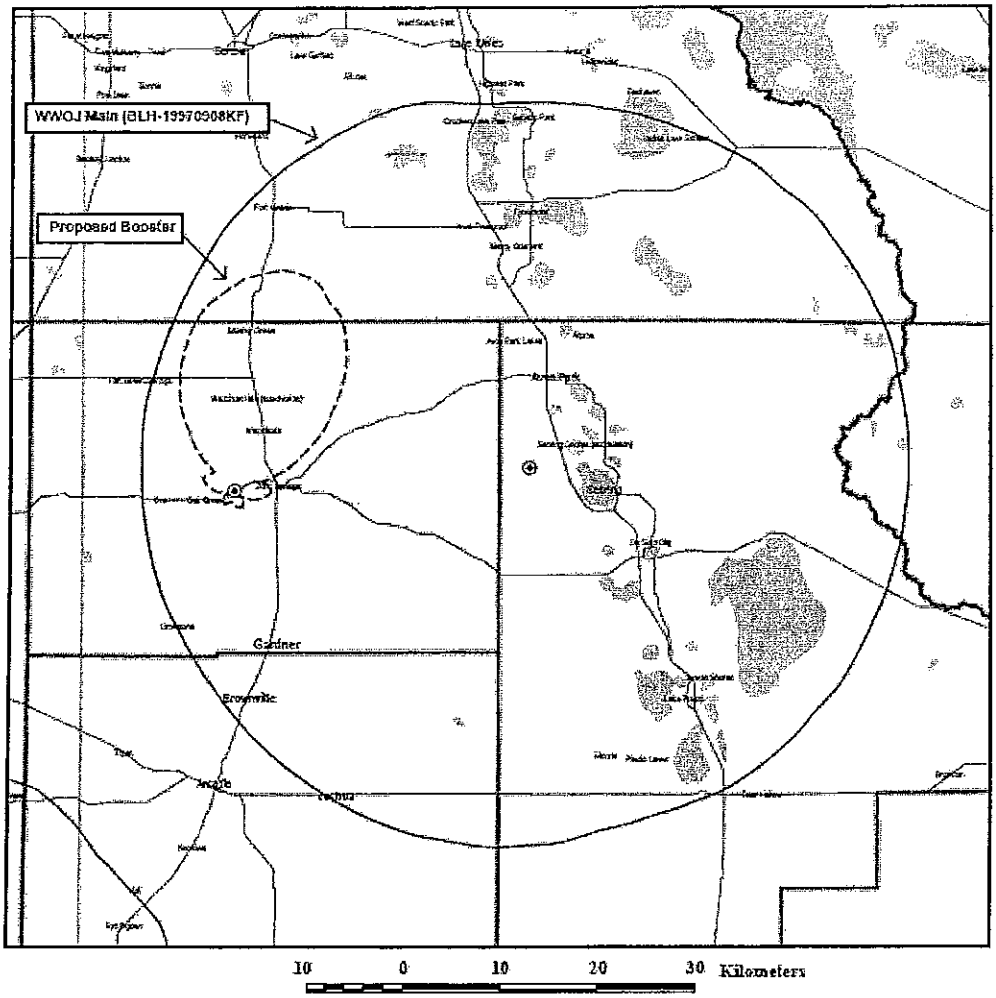


Figure 17: Wauchula Booster 60 dBμV/m Service Contour

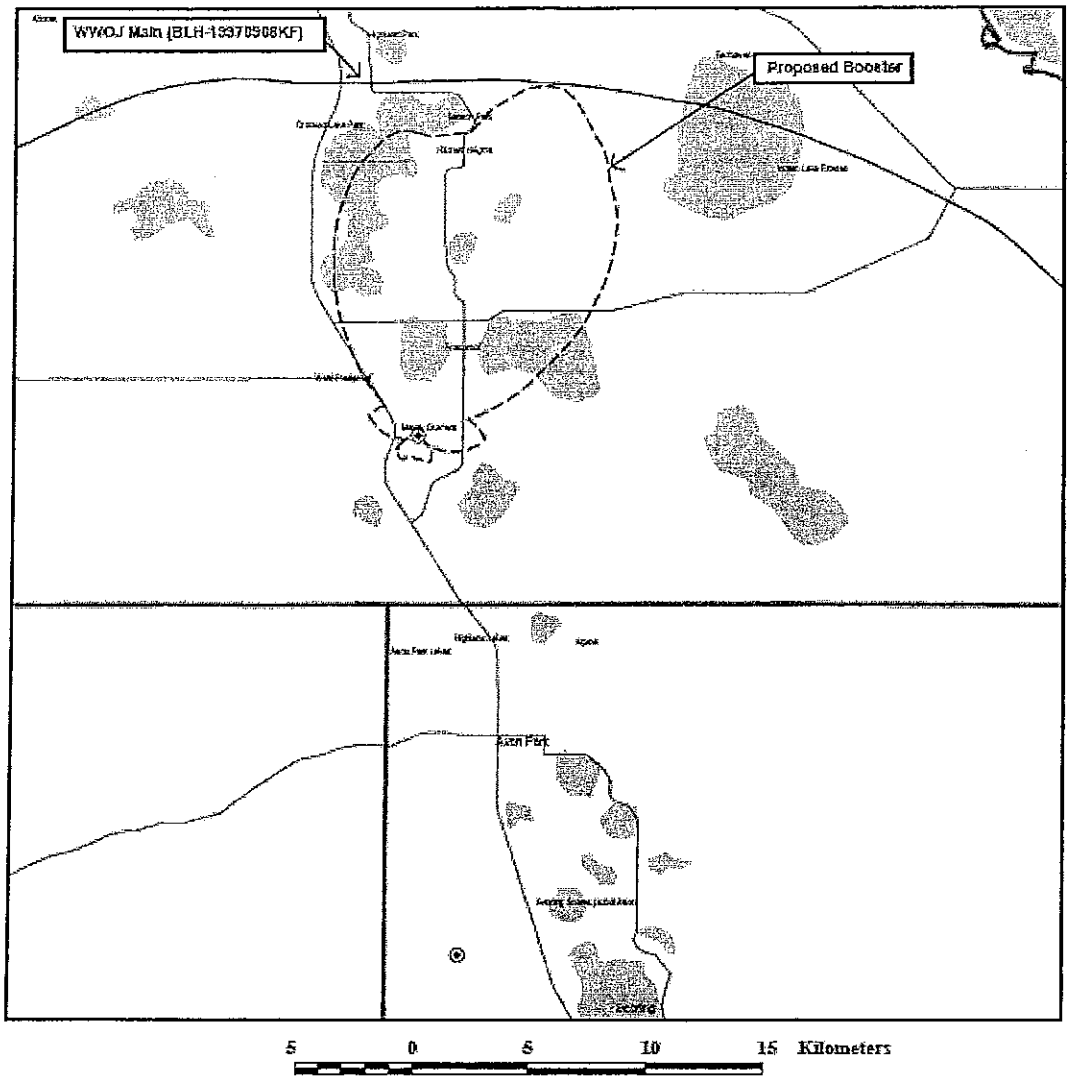


Figure 18: Frostproof Booster 60 dBμV/m Service Contour

NETWORK INFRASTRUCTURE AND TARGETED SPOT INSERTION

AUDIO DISTRIBUTION NETWORK

Because this network was constructed from the ground up, on tower co-locations, a method of sending distinct audio messages to the boosters was needed during both the simulcast Non-Targeted and Targeted PSA spot times. This was accomplished by constructing a separate 5.8 GHz Microwave wireless distribution network from the KZZS (FM) studio in Zolfo Springs to all three boosters. Additionally, implementation of control point infrastructure at the main studio (WWOJ (FM)), distribution of control signals through an IP network to the Lazer Spot control point, and then distribution of stored audio from the Laser Spot control point to the three booster locations over a private IP network occurred for the test. Two modes of operation occurred in regards to PSA spot insertion: One involved simulcasting, on the booster network, the exact same PSA spot as the main (WWOJ (FM)) was broadcasting, the second was to simulcast a different PSA spot than the main was broadcasting. The goal was to determine relevant differences in audio quality between the two methods and this was the main goal of the testing.

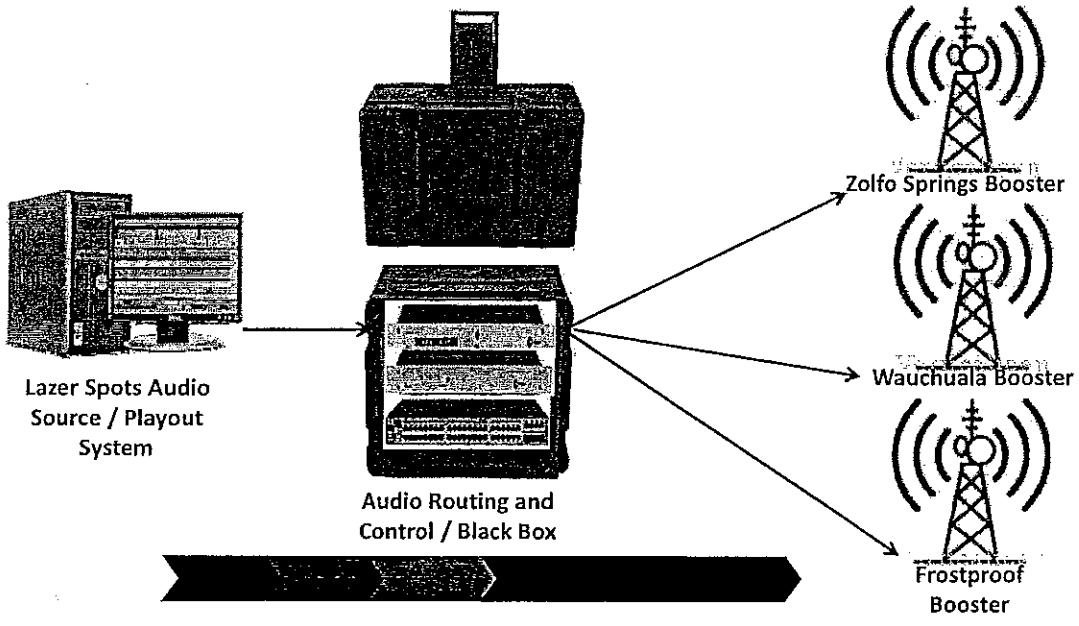


Figure 19: Audio and Microwave Distribution Network

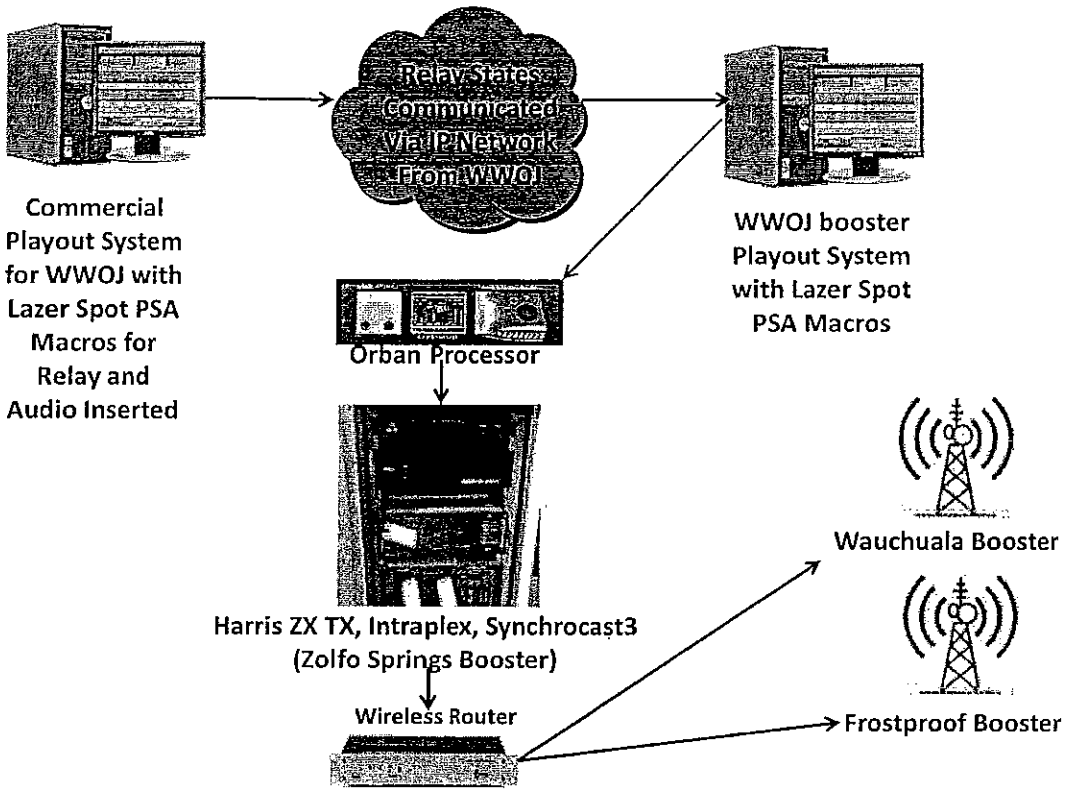


Figure 20: Audio and Microwave Distribution Network

THE LAZER SPOTS™ 'DBH CONTROL UNIT' (Patent Pending)

The Lazer Spots™ 'DBH Control Unit' is defined as a proprietary implementation of hardware and software that typically resides at the broadcast studio. The 'DBH Control Unit' design directs different audio feeds from new and existing automation and playout equipment (such as RCS -Prophet Systems, ENCO Systems, AudioVault-Broadcast Electronics, Scott Studios, Computer Concepts -Maestro, BSI Simian, WideOrbit- former Google automation, OMT Technologies –iMediatouch and others), through the 'DBH Control Unit' to different transmitter sites, while simultaneously turning the transmitters on and off (and/or increasing and decreasing the transmitters power) in synchronization with the new audio targeted audio feeds.

The 'DBH Control Unit' design is based on Ethernet, a mature technology which is the clear direction for audio routing. The major components use equipment which is 100% compatible with Ethernet networking standards, including Cisco networking equipment. The same network that switches and distributes live, linear audio targeted channels also carries GPIO signals, file transfers, and any other standard IP data.

The hardware and software that the 'DBH Control Unit' houses includes analog and digital input and output interfaces, General Purpose Input and Output (GPIO) logic interfaces, both trigger (TTL low-level voltage) and contact closure relays connections, routing software which controls consolidated access to all interfaces, and a Cisco Catalyst-Ethernet switch to connect interface nodes, PCs, WAN devices, and an internal playout system thru 10/100/1000 Mbps ports. The 'DBH Control Unit' performs timed updates (or via contact closure or audio detection) to reconfigure a few or many sources and destinations simultaneously. It also can provide the generation of Target spot audio if necessary.

ROUTING, SWITCHING, AND CONTROL FOR TARGETED SPOT DELIVERY

Each implementation of the 'DBH Control Unit' will vary in configuration depending on the broadcast studio audio equipment and STL interfaces. For WWOJ (FM), during the Targeted spot time (two to three times per hour), pre-produced 30 second Targeted spot audio streams were generated with a PC-based playout system. A relay trigger pulse from the existing on-air playout system to the 'DBH Control Unit' initiated the generation of Targeted audio playout streams. This was done by creating a script command in the existing playout system before each of the Targeted spots to pulse a relay that was connected to a trigger on the 'DBH Control Unit'. Once the trigger was pulsed, audio streams (the pre-produced Target spots) as well as GPIO control information were generated and output to an Ethernet switch/router at the IP network level.

The Ethernet switch/router interfaced directly with an IP Microwave distribution network using Harris Sychrocast 3™ IP equipment, with linear uncompressed audio. The network connected directly to a wireless router at the Zolfo Springs booster transmission site. At this site another wireless connection was made to the Wauchula booster and then to the Frostproof booster transmission site.

At the microwave connected booster sites, a digital IP relay device controlled the power amplifiers which received digital audio from the Harris Synchrocast 3™ stream by using the GPIO signals generated at the 'DBH Control Unit'.

ANALYSIS AND RATING OF THE AUDIO AND EFFECTIVENESS OF TARGETED SPOT DELIVERY WITH BOOSTERS

AUDIO SAMPLE RECORDINGS

In the WWOJ (FM) service contour, the three boosters create two distinct coverage areas, in terms of RF isolation and segregated markets. As a comparative reference, each booster play the same Public Service Announcements (PSAs) as the main WWOJ (FM) transmitter at the same time, and then the same tests were performed with a different PSA spot than the main. For WWOJ (FM), radio spots (non-commercial and commercial) start approximately at: :26, :42, and

:56 minutes of each hour, and broadcasts a country music format. The test PSAs were 30 seconds in length each, and occurred 2 to 3 times per hour depending on spot availability.

Preliminary testing occurred on 11/15/2011 to 12/01/2011 to determine appropriate test locations and drive distances between test locations. It is important to mention that 10 minutes to 30 minutes elapsed between spots, so drive distances had to be determined- typically 5-10 miles apart, and compensated by roads, construction delays, and alternate routes for high traffic or accidents. A typical test location was in an empty field or parking lot with no close obstructions.

The submitted audio clips were recorded in the field on 12/2/2011 to 12/22/2011. Audio information was collected at 20 geographical locations as described in this report. At each of the 20 test locations, a measurement of the Non-Targeted, normal simulcast audio was made for a PSA spots that occurred in rotation. These PSA spots are used as a comparative reference to the Targeted PSA spot. For the targeted-test mode, a distinct spot was broadcast on each booster. These spots were in simulcast synchronization mode, as was the reference PSA spots. When the PSA spots were not being recorded the booster transmitter PAs were muted. The goal was to monitor and analyze the audio at the 20 test locations for quality of reception as compared to the Non-Targeted PSA spot.

At each of the 20 measured locations, each audio file attached with this report has the following format:

-Approximately 125 seconds in length.

-30 seconds of WWOJ non-simulcast audio before the Simulcast (same content) spot, the 30 second Simulcast (same content) spot, and then 30 seconds of WWOJ audio after the Simulcast (same content) spot. Note this spot varies, one of 21 different PSAs that rotated.

-5 seconds of silence.

-30 seconds of WWOJ audio before the Targeted (different content reference) spot, the 30 second Targeted (different content reference) spot, 30 seconds of WWOJ audio after the Targeted (different content reference) spot. Also note that areas marked with (WWOJ) mean that the main WWOJ transmitter captured the receiver at that test point, so that the reference spot cannot be heard.

This format allows the listener to easily compare subjectively the Simulcast (same content) spot audio to the Targeted (different content reference) spot.

NON TARGETED (SIMULCAST) PSA AUDIO SPOT

As mentioned, at each of the 20 test locations a measurement of the Non-Targeted simulcast audio were made for a one of the 21 PSA spots in rotation, as shown in Figure 21:

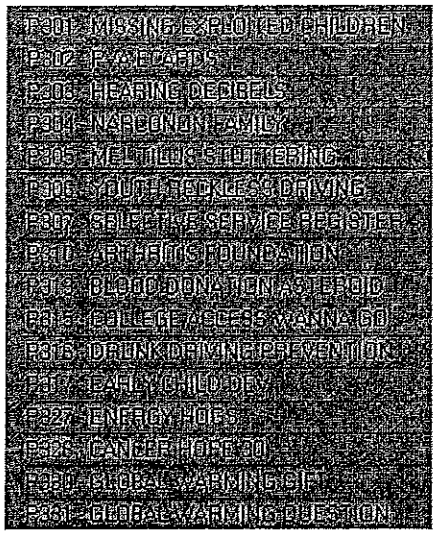


Figure 21: Rotated Reference Simulcast PSA Spots

TARGETED (NON-SIMULCAST) PSA AUDIO SPOTS

For the targeted-test mode, a distinct PSA spot was simulcast on the each of the three boosters. This spot was simulcast at the same time the main WWOJ (FM) was playing a different PSA spot. The goal was to monitor and analyze the audio at the 20 test locations for quality of reception as compared to the non-targeted PSA spot. The spot used with 30 seconds in length and titled "Living Healthy and Green-USEARADON" described the dangers of Radon gas.

OBJECTIVE AUDIO ANALYSIS FOR NON-TARGETED/TARGETED SPOTS RESULTS

The measurement receiver and collection software, GoldenEar™ developed by WorldCast Systems.com/Audemat division, is described in other sections. The GoldenEar™ software is meant to provide a numerical method for quantifying a pure subjective concept, which is quality of received FM audio. As the method is a numerical one, it will be applied every time the same way, therefore it is an objective measure, as opposed to having numerous subjects listen and evaluate the audio.

The GoldenEar™ quality algorithm uses measured data to form a quality rating, ranging from 1 to 5, 5 being the best and 1 being the worst. An indication of the grading scale algorithm is intended to be analogous to ITU-R (BS.1284-1) [3] recommendations. The following five-grade

[3] RECOMMENDATION ITU-R BS.1284-1*General methods for the subjective assessment of sound quality

scale is appropriate for the assessment of sound quality and impairment for the grading of the WWOJ (FM) test audio samples which is specified by the ITU-R recommendations.

Quality		Impairment	
5	Excellent	5	Imperceptible
4	Good	4	Perceptible, but not annoying
3	Fair	3	Slightly annoying
2	Poor	2	Annoying
1	Bad	1	Very annoying

Table Four: ITU-R Grading Scales

For comparison tests, the following ITU-R comparison scale is based on numerical differences using the above five-grade scales for the purposes of comparing the Non-Targeted PSA reference spot to the Targeted PSA spots.

Comparison	
3	Much better
2	Better
1	Slightly better
0	The same
–1	Slightly worse
–2	Worse
–3	Much worse

Table Five: ITU-R Comparison Scales

As indicated in Table Six, the Non-Targeted Simulcast PSA spots had an objective quality range of 3.30 to 4.90, with a 20 location average of 4.08. The Targeted PSA spot had an objective quality range of 3.63 to 4.90, with a 20 location average of 4.06. The difference between the two averages is 0.02, with the Non-Targeted result being less than a Slightly Better rating when compared to the Targeted results as indicated in Table x.

	RELATIVE FIELD LEVEL (dBμV/m)	SAME PSA AUDEMAT QUALITY INDEX	TARGETED PSA AUDEMAT QUALITY INDEX
SAMPLE 1	41.07	3.63	3.86
SAMPLE 2	111.73	4.10	4.00
SAMPLE 3	80.63	3.60	3.63
SAMPLE 4	71.67	4.00	4.10
SAMPLE 5	65.27	4.00	4.00
SAMPLE 6	61.97	4.23	4.53
SAMPLE 7	51.70	3.30	3.63
SAMPLE 8	88.69	3.70	3.76
SAMPLE 9	63.51	3.90	3.92
SAMPLE 10	55.00	4.00	4.00
SAMPLE 11	69.00	4.20	4.00
SAMPLE 12	77.03	4.00	4.00
SAMPLE 13	70.57	4.00	4.00
SAMPLE 14	62.03	4.53	4.00
SAMPLE 15	61.10	3.80	3.78
SAMPLE 16	70.00	4.55	4.25
SAMPLE 17	66.72	4.10	4.00
SAMPLE 18	53.77	4.87	4.73
SAMPLE 19	56.24	4.28	4.10
SAMPLE 20	68.40	4.90	4.90
AVERAGE	67.30	4.08	4.06

Table Six: Objective Audio Test Results

Based on the fact that that all PSA spots were completely perceptible, it is concluded that the implementation of the Lazer Spots™ Targeted messaging test was shown to be extremely successful- it is believed that it could acceptably be implemented commercially.

APPENDIX ONE: AUDEMAT FM-MC4 CALIBRATION DATA

On September 8, 2010 the Audemat FM-MC4™, antenna and RF cable were sent to the Audemat Lab in Paris for calibration. Some of the calibration data is shown below.

ANTENNA CALIBRATION

This window displays antenna response curve to be displayed as well as different loss and gain values to be taken into account for calculating the field level's real value from the raw value supplied by the measuring equipment during station acquisition.

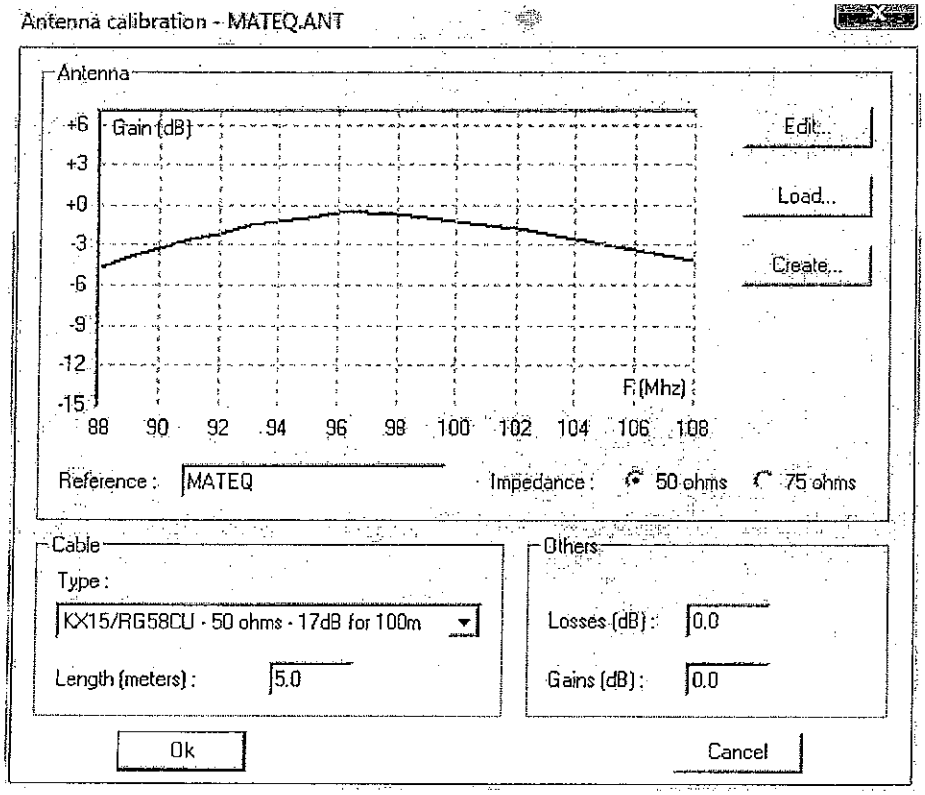


Figure 22: Antenna Calibration Curves

RECEIVER CALIBRATION

This window displays the receiver's response curve of the FM-MC4™ equipment used. The window displays the curves corresponding to different frequencies for which the equipment has

been calibrated. These values are in the receiver calibration file which is loaded when the program is launched. This file is supplied with the equipment or when recalibrated in the factory.

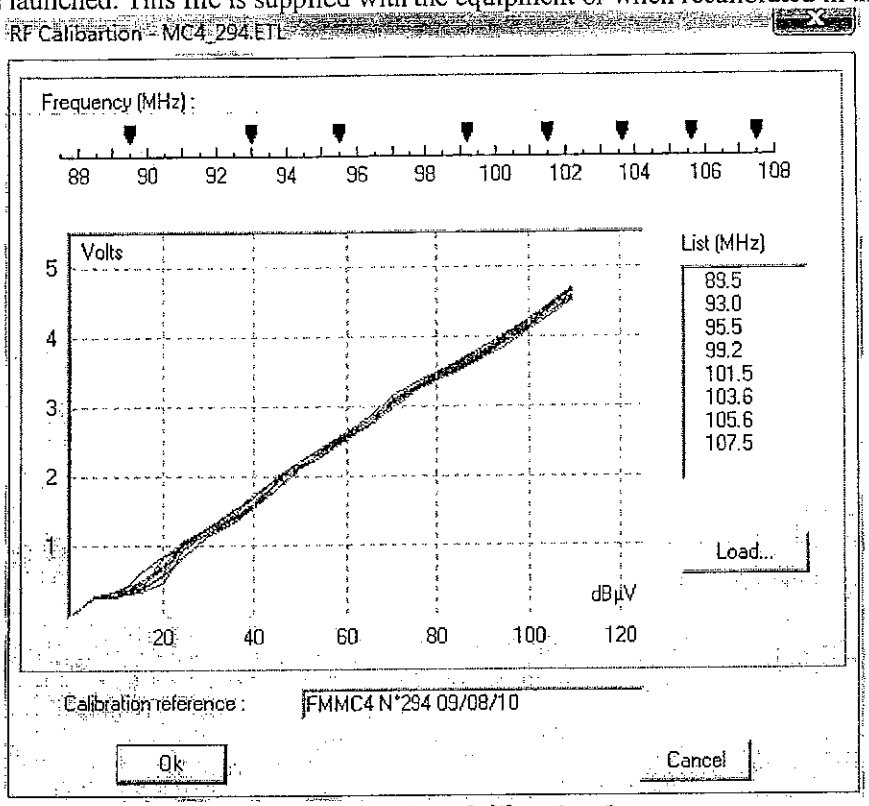


Figure 23: RF Receiver Calibration Curves

APPENDIX TWO: REFERENCE STANDARDS RELEVANT TO THIS REPORT

FCC AUDIO DIVISION

http://www.fcc.gov/mb/audio/

The Media Bureau licenses commercial and noncommercial educational AM, FM, FM Translator, and FM Booster radio services, and also the noncommercial educational Low Power FM radio service. The Division provides legal analysis of broadcast, technical and engineering radio filings and recommends appropriate disposition of applications, requests for waivers, and other pleadings. Telecommunications falls under **Title 47** of the CFR. AM, FM, and TV broadcast stations fall under **Part 73 and 74** of Title 47.

INTERNATIONAL TELECOMMUNICATIONS UNION (ITU)

ITU Radiocommunication Sector

http://www.itu.int/ITU-R/index.html

ITU-R BS.1114-5: Systems for terrestrial digital sound broadcasting to vehicular, portable and fixed receivers in the frequency range 30-3,000 MHz

ITU-R BS.412-9 17, ANNEX 3: Protection ratio for FM sound broadcasting in the case of the same programme and synchronized signals

ITU-R BS.1387-1: Method for objective measurements of perceived audio quality

ITU-R BS.1284-1 General methods for the subjective assessment of sound quality

WORLDCAST SYSTEMS / AUDEMAT DIVISION MENTION REFERENCES

http://worldcastsystems.com/

CCIR [Recommendation 638] : Terms and definitions used in planning frequencies for audio and television Broadcasting – Protection ratio in Audio Frequency

CCIR [Recommendation 559-2] : Objective measuring of RF protection ratios in broadcasting – parameters taken into consideration

CCIR [Recommendation 559-2] : Objective measuring of RF protection ratios in broadcasting – Standardised noise spectrum – Colored noise signal used for generator modulation

CCIR [Recommendation 641] : Determining RF protection ratios in audio broadcasting at frequency modulation –Appendix 1 – Maximum deviation of measurement generator frequency

IUT-R [Recommendation BS.450-2] : Transmission standards for audio broadcasting at frequency modulation in metric waves

IUT-R [Recommendation 412-6] : Planning standards for audio broadcasting at frequency modulation in metric waves – Note 4 – Sinusoid signal power

IUT-R [Recommendation 412-7] : Planning standards for audio broadcasting at frequency modulation in metric waves – Appendix 4 – Measuring complete multiplex signal power and peak deviation of an FM audio broadcasting signal

IUT-R [Recommendation 642-1] : Limiters for high quality radio-phonic program signals AFNOR 97330 :Weighting curve representing average musical messages

CEPT/ERC : [Recommendation ERC 54-01 E] – Method of measuring the maximum frequency deviation of FM Broadcast emissions in the band 87,5 MHz to 108 MHz at monitoring stations

UIT-R [Recommendation 704] : Characteristics of reference receivers in audio broadcasting at frequency modulation, at end of planning

UIT-R [Recommendation 599] : Audio broadcasting reception antenna directivity

APPENDIX THREE: FCC EXPERIMENTAL AUTHORIZATION

FEDERAL COMMUNICATIONS COMMISSION
445 TWELFTH STREET SW
WASHINGTON DC 20554

MEDIA BUREAU
AUDIO DIVISION
APPLICATION STATUS: (202) 418-2730
HOME PAGE: www.fcc.gov/mb/audio/

ENGINEER: CHARLES N. (NORM) MILLER
TELEPHONE: (202) 418-2767
FACSIMILE: (202) 418-1410
E-MAIL: charles.miller@fcc.gov

September 28, 2011

Aaron P. Shainis, Esq.
Shainis & Peltzman, Chartered
1850 M Street, NW, Suite 240
Washington, DC 20036

In re: Cohan Radio Group, Inc.
WWOJ (FM), Avon Park, Florida
Facility Identification Number: 27199
Application for Experimental Authorization

Dear Counsel:

The staff has before it a request for an Experimental Authorization, filed July 19, 2011, and supplemented on September 22, 2011, on behalf of Cohan Radio Group, Inc. ("Cohan"), licensee of Station WWOJ(FM), Avon Park, Florida.[1] Cohan proposes to conduct experimental operations to determine the feasibility of broadcasting independent, targeted messages on FM Booster stations. Cohan proposes to construct three temporary FM Booster facilities and to broadcast noncommercial announcements on the booster stations while simultaneously broadcasting different programming on the main station. Cohan proposes to use proprietary technology provided by Lazer Spots, LLC, which will allow different announcements to be placed on the boosters in a synchronized time sequence. Other than the foregoing, no changes to the authorized technical facilities are contemplated. Cohan states that the experimental broadcasts will be conducted over a 60-day period.

Our review indicates that the proposed experimental operation meets the requirements of Section 73.1510 of the Commission's rules and that the proposed experimental operation is not likely to result in interference to any other station. Although some intrasystem interference is to be expected from the experimental operation, we believe that Cohan will act in its own self-interest to minimize any detrimental effect on its listeners. We find that the Public Interest would be served through the collection of data on the feasibility of transmitting independent, targeted announcements on FM Boosters, which could be used in support of a Petition for Rule Making to modify the Commission's Rules to permit the use of such transmissions. We believe that, in order to provide for setup and preliminary testing of the booster facilities in addition to the proposed 60-day experimentation, a term of 120 days is appropriate.

Accordingly, the request for Experimental Authorization IS GRANTED. Station WWOJ may construct the following temporary FM Booster facilities:

[1] WWOJ is licensed for operation on Channel 256C3 (99.1 MHz), with effective radiated power of 10 kilowatts (H&V) and antenna height above average terrain of 157 meters.

1.	Booster location:	Zolfo Springs, Florida
	Geographic coordinates:	27° 21' 59" N, 81° 47' 52" W (NAD 1927)
	Channel	256 (99.1 MHz)
	Effective radiated power:	Not to exceed 5 kilowatts (Max-DA, V only)
	Antenna type:	Composite array, Four Aldena, model ALP.08.02.712 log periodic antennas, 2 x 2 stack, directional
	Antenna orientation:	0° True
	Antenna height:	
	above ground:	64 meters
	above mean sea level:	81 meters
	above average terrain:	64 meters
2.	Booster location:	Wauchula, Florida
	Geographic coordinates:	27° 29' 24" N, 81° 50' 29" W (NAD 1927)
	Channel	256 (99.1 MHz)
	Effective radiated power:	Not to exceed 5 kilowatts (Max-DA, V only)
	Antenna type:	Composite array, Four Aldena, model ALP.08.02.712 log periodic antennas, 2 x 2 stack, directional
	Antenna orientation:	12° True
	Antenna height:	
	above ground:	72 meters
	above mean sea level:	96 meters
	above average terrain:	72 meters
3.	Booster location:	Frostproof, Florida
	Geographic coordinates:	27° 42' 41" N, 81° 33' 04" W (NAD 1927)
	Channel	256 (99.1 MHz)
	Effective radiated power:	Not to exceed 5 kilowatts (Max-DA, V only)
	Antenna type:	Composite array, Four Aldena, model ALP.08.02.712 log periodic antennas, 2 x 2 stack, directional
	Antenna orientation:	13° True
	Antenna height:	
	above ground:	38 meters
	above mean sea level:	76 meters
	above average terrain:	38 meters

During the 60 day test period, Cohan may transmit independent, noncommercial announcements on the temporary FM Booster Stations as described above. Limited waiver of 47 C.F.R. Section 74.1231(h) is granted to the extent necessary for the proposed experimentation. Cohan shall employ whatever means are necessary to prevent excessive exposure of workers or the public to radio frequency radiation, pursuant to Section 1.1310. Within 60 days following completion of the experimental operation authorized herein, Cohan shall file a full report of the research.

EXECUTIVE SUMMARY

BACKGROUND FOR TEST AUTHORITY

Geo-Broadcast Solutions, LLC, ("GBS") has developed a system whereby a network of synchronous FM boosters can originate programming separate from a primary FM station – a system known as "ZoneCasting™". This technology uses lower power, lower height FM transmitters operating on the same frequency, and within the service contour, of a primary FM station transmitter. This test plan is intended to determine the compatibility of ZoneCasting with standard FM broadcast stations and measures the potential for interference received by listeners.

GBS has petitioned the FCC (reference) to modify FCC rule XX which would allow the Zonecasting system to operate without further authority from the Commission. Experimental Authorizations have been granted by the Commission and tests have been successfully conducted in Florida (reference), Utah (reference) and the latest tests have just been completed in Milwaukee under the Experimental Authorization granted by the Commission on XXXX on behalf of Digity Companies, LLC. The station which was authorized and tested in this most recent evaluation is WIIL(FM) Channel: 236B 95.1 MHz Union Grove, Wisconsin, which is currently owned by Alpha Media Licensee LLC.

DESCRIPTION OF TEST

GBS has developed a system that will allow an FM radio station to divide its signal into segments with the use of proprietary booster system design, audio and control switching, routing, hardware, software and implementation techniques. This new idea would allow the station to run different audio messages, such as Public Service Announcements (PSAs), traffic, weather, amber alerts, and commercial announcements on different booster transmitters simultaneously, thereby creating additional time capacity for such announcements. GBS holds U.S. Patent # 8,862,048 on this technology "Equipment, System and Methodologies for Segmentation of Listening Area into Sub-Areas Enabling Delivery of Localized Auxiliary Information", as well as patents pending. The patented concept of adding uniquely designed FM boosters to an existing FM broadcast station within the protected service area of the main station and specifically designed for targeted messaging is an expertise of GBS. It allows the ability to target listeners with more local relevant information as well as free up valuable broadcast messaging time. This report details the third test that GBS has performed on behalf of the FCC to validate the ZoneCasting concept. The first two tests met the FCC testing criteria. This third test focuses on mobile testing and resulting audio transition quality.

With the test described herein, GBS conducted experimental operations on station WIIL (FM) to determine the feasibility of broadcasting independent, targeted messages on co-channel FM Booster stations in the Milwaukee, Wisconsin area. GBS constructed four temporary FM Booster sites with seven FM Boosters to periodically broadcast noncommercial announcements on the

booster stations while simultaneously broadcasting different programming on the main station. This created a ZoneCasting "Zone" in downtown and northeast Milwaukee. The unique urban test area posed unique challenges to the system design due to multiple sources of signal reflections. It is thought that this type of implementation creates the most stress on the system and creates a difficult test bed.

Leading up to and incorporated in this test, technology and propagation analysis developed and utilized by Geo and its technical partners and the knowledge gained from this and the previous tests has allowed Geo to significantly advance the art since the first tests were established five years ago. Synchronization of the main transmitter with the booster transmitters has developed significantly over the last few years, allowing identical modulation to within just a few tenths of one decibel, identical frequency matching using GPS synchronization, and stable, real-time FM envelope synchronization has been developed to a point not achievable until recently. Characterization of FM exciters used in various brands of transmitters has also added to the knowledge base so that precise control of the synchronization can be better achieved. The art has progressed in the areas of synchronization such that when local programming is not separate from main programming, the simulcast local in-building listening quality and signal strength is augmented over that of just the main transmitter alone with virtually no areas of self-interference even with no terrain blockage. This enhances the listening experience in all environments. When separate programming is introduced to the boosters in the Zone area, the close matching of many of the above parameters can also significantly reduce any interference areas.

Based upon the tests routes driven and analysis conducted by Geo, when separate programming is initiated in the Zonecasting zone, an area, in this case, covering under XX percent of the total listening audience receives some interference in the transition area only during the brief time programming is separate (usually under XX minutes per hour). By placing multiple close-by low-height transmission "nodes" and back-to-back antennas, Geo has reduced the interference in the transition zone between differing program materials in most cases to well under a minute in the mobile environment.

The detailed description, test routes, audio samples and analysis of the testing conducted during the FCC authorized Experimental Authorization follows this executive summary.

CONCLUSION

GBS has conducted this third in a series of tests proving the technical concept of using segmented programming material to different zones to augment the information available to listeners. The results have proven that in a properly designed system, with multiple

ATTACHMENT C

Stamp and Return

Wiley Rein LLP

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WASHINGTON, DC 20006
PHONE 202.719.7000

www.wileyrein.com

February 2, 2017

Gregory L. Masters
202.719.7370
GMasters@wileyrein.com

VIA HAND DELIVERY

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: **Alpha Media Licensee LLC**
WIIL(FM), Union Grove, Wisconsin
Facility ID No. 28473
Report Pursuant to Experimental Authorization

Dear Ms. Dortch:

Pursuant to 47 C.F.R. § 5.203 and the May 27, 2016 letter of the Deputy Chief, Audio Division, Media Bureau (the "Bureau Letter"), we are transmitting herewith on behalf of Alpha Media Licensee LLC ("Alpha"), licensee of WIIL(FM), Union Grove, Wisconsin, the required report following the completion of the experimental operation authorized by the Bureau Letter. The testing was performed on an intermittent basis between September 15, 2016 and December 14, 2016 under Alpha's supervision, in association with technical services provided by Geo-Broadcast Solutions, LLC ("GBS"). The principal focus of the testing was to determine the efficacy of the GBS technology in a mobile environment.

Should there be any questions concerning this matter, please contact the undersigned.

Very truly yours,

Gregory L. Masters

cc: James Bradshaw, Audio Division, Media Bureau (via e-mail)
Robert Gates, Audio Division, Media Bureau (via e-mail)

ZoneCasting™ Proposed Test

Geo-Broadcast Solutions, LLC
Alpha Media Licensee, LLC Partnership

WIIL(FM) Channel: 236B 95.1 MHz Union Grove, WI
ZoneCasting Zone: Milwaukee, WI

Geo-Broadcast Solutions, LLC
875 North Michigan Ave.
Suite 3708 |
Chicago, IL 60611

December 21, 2016

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EXECUTIVE SUMMARY

BACKGROUND FOR TEST AUTHORITY

Geo-Broadcast Solutions, LLC, ("GBS") has developed a system whereby a network of synchronous FM boosters can originate programming separate from a primary FM station – a system known as "ZoneCasting™". This technology uses lower power, lower height FM transmitters operating on the same frequency, and within the service contour, of a primary FM station transmitter. This test plan is intended to determine the compatibility of ZoneCasting with standard FM broadcast stations and measures the potential for interference received by listeners.

GBS has filed a Petition for Rulemaking to modify FCC rule 47CFR 74.1231(i) to allow the Zonecasting system to operate without further experimental authority from the Commission. Experimental Authorizations have been granted by the Commission and tests have been successfully conducted in Avon Park, Florida, and Randolph, Utah, and the latest tests have just been completed in the Milwaukee area under the Experimental Authorization granted by the Commission on May 27, 2016. The station which was utilized in the most recent testing was WIIL(FM) Channel: 236B 95.1 MHz Union Grove, Wisconsin, which is licensed to Alpha.

GENERAL DESCRIPTION OF TEST

GBS has developed a system that will allow an FM radio station to divide its signal into segments with the use of proprietary booster system design, audio and control switching, IP routing, hardware, software and implementation techniques. This innovative idea allows a primary FM broadcast

station to run different audio messages, such as Public Service Announcements (PSAs), traffic, weather, amber alerts, and commercial announcements on different booster transmitters simultaneously, thereby creating additional time capacity for such announcements. GBS holds U.S. Patent # 8,862,048 on this technology "Equipment, System and Methodologies for Segmentation of Listening Area into Sub-Areas Enabling Delivery of Localized Auxiliary Information", as well as patents pending. This third test focuses on mobile testing and resulting audio transition quality.

With the tests described herein, GBS conducted experimental operations on station WIIL (FM) to determine the feasibility of broadcasting independent, targeted messages on co-channel FM Booster stations in the Milwaukee, Wisconsin area. GBS constructed four temporary FM Booster sites with seven FM Boosters to periodically broadcast noncommercial announcements on the booster stations while simultaneously broadcasting different programming on the main station. This created a ZoneCasting "Zone" in downtown and northeast Milwaukee. The urban test area posed unique challenges to the system design due to multiple sources of signal reflections. It was thought that this type of implementation creates the most stress on the system and created a difficult and challenging test bed.

Leading up to and incorporated in this test, technology and propagation analysis developed and utilized by GBS and its technical partners and the knowledge gained from this and the previous tests has allowed GBS to significantly advance the art since the first tests were established five years ago. Synchronization of the main transmitter with the booster transmitters has developed significantly over the last few years, allowing identical modulation to within just a few tenths of one decibel, identical frequency matching using GPS synchronization, and stable, real-time FM envelope synchronization has been developed to a point not achievable until recently. Characterization of FM exciters used in various

brands of transmitters has also added to the knowledge base so that precise control of the synchronization can be better achieved. The art has progressed in the areas of synchronization such that when local programming is not separate from main programming, the simulcast local in-building listening quality and signal strength is augmented over that of just the main transmitter alone with virtually no areas of self-interference even with no terrain blockage. This enhances the listening experience in all environments. When separate programming is introduced to the boosters in the Zone area, the close matching of many of the above parameters can also significantly reduce any interference areas even though the programming itself is different.

Based upon the test routes driven and analysis conducted by GBS, when separate programming is initiated in the Zonecasting zone, an area, in this case, covering under one percent of the total listening audience, interference is received in the transition area only during the brief time programming is separate. By placing multiple close-by low-height transmission "nodes" and back-to-back antennas, GBS has reduced the interference in the transition zone between differing program materials in most cases to well under fifteen seconds, in most instances, in the mobile environment.[2]

The detailed description, test routes, and analysis of the testing conducted during the FCC authorized Experimental Authorization follows this executive summary.[3]

ZONECAST DESIGN

In addition to internal GBS research and field tests, GBS has funded and has quantified research results to determine the parameters for interference with a ZoneCasting network. The parameters were derived from accurate simulations of transmitted FM signals at NPR Labs, which

[2] Clearly this is *de minimus*.
[3] Audio samples will be provided upon request.

were then evaluated by a large group of listeners in controlled subjective testing at Towson University[4] For ZoneCasting, these parameters define the RF interference (C/I) ratios in both stereophonic and monophonic FM transmission, for fixed and mobile reception.

Extensive network design work at NPR Labs has identified the power and height for the ZoneCasting nodes under a variety of primary station types and terrain conditions.

Using appropriate parameters for these nodes, interference within the target area of the zone can be effectively eliminated. This requires a sufficient density of nodes (per square kilometer) to provide field strengths at all locations across the target area to overcome the primary transmitter's signal by a prescribed interference ratio.

Interference between the ZoneCasting network and the primary transmitter's signal occurs in a boundary area around the zone where neither the ZoneCasting signal nor the primary transmitter signal exceeds a specific interference ratio. While this boundary interference cannot be eliminated, the experimental testing as detailed in this report demonstrates that this residual interference can be reduced by lowering the power and height of each node, and increasing the number of nodes within the desired zone area. These results suggest that the area of residual interference may be technically controlled to fall within less populated area and overall can be designed to be acceptably small, in comparison with the overall larger service area of the primary station and the derived benefits of ZoneCasting.

The ZoneCasting origination is intended to operate for only a few minutes per hour, during programming breaks, therefore, the impact of potential interference to listeners is not considered to be significant.[5] Further, by combining Maxxcasting technology (which is inherently a part of the

[4] The methodology for laboratory and listener testing of both ZoneCasting and MaxxCasting is described in "Design Parameters for FM Signal Repeaters Based on Listener Testing", Dr. Ellyn Sheffield, Melinda Hines and John Kean, NAB 2013 Broadcast Engineering Conference Proceedings. Also see Appendix two of this report

[5] Interference to main station's signal. Because booster stations operate on the same frequency as the primary station, operation of the booster may cause interference to reception of the main station's signal. However, booster stations may not cause Interference to reception

Zonecasting topology) during periods when the Zonecasting is inactive, the station's listeners in the Zonecasting areas will experience significantly improved signal quality and building penetration.

BOOSTER LOCATIONS

The proposed zone consists of four transmission sites with seven distinct FM transmitters, each with its own antenna array.

Table 1: Proposed Booster Locations

Site Number	Address	ASR or ATC#	Type	Antenna RAD AGL (m)	Antenna RAD AGL (m)	Antenna RAD AGL (ft)	MAX ERP (W)	Azimuth (deg)
1A	BREWERY WORKS RT WI / Schlitz	275915	Roof Top	25	23	82	3650	100
1B	BREWERY WORKS RT WI / Schlitz	275915	Roof Top	25	23	82	255	250
2 SBA	Milwaukee WI1	1060030	Monopole	30	40	98	5000	140
4A	Hilton Milwaukee City Center	1057880	Tower	135	88	442	500	85
4B	Hilton Milwaukee City Center	1057880	Tower	140	88	461	350	250
5A	Phoenix Building	US-WI-6004	Roof Top	25	23	82	1500	85
5B	Phoenix Building	US-WI-6004	Roof Top	25	23	82	1000	250

of the primary station's signal within the community of license. The main station's signal may also cause interference to reception of the booster station. It Is up to the licensee of the primary station to decide whether the gain realized by the booster offsets any potential interference. See 47 CFR Section 74.1203(c).

Figure 1: Milwaukee Transmission Locations Aerial View

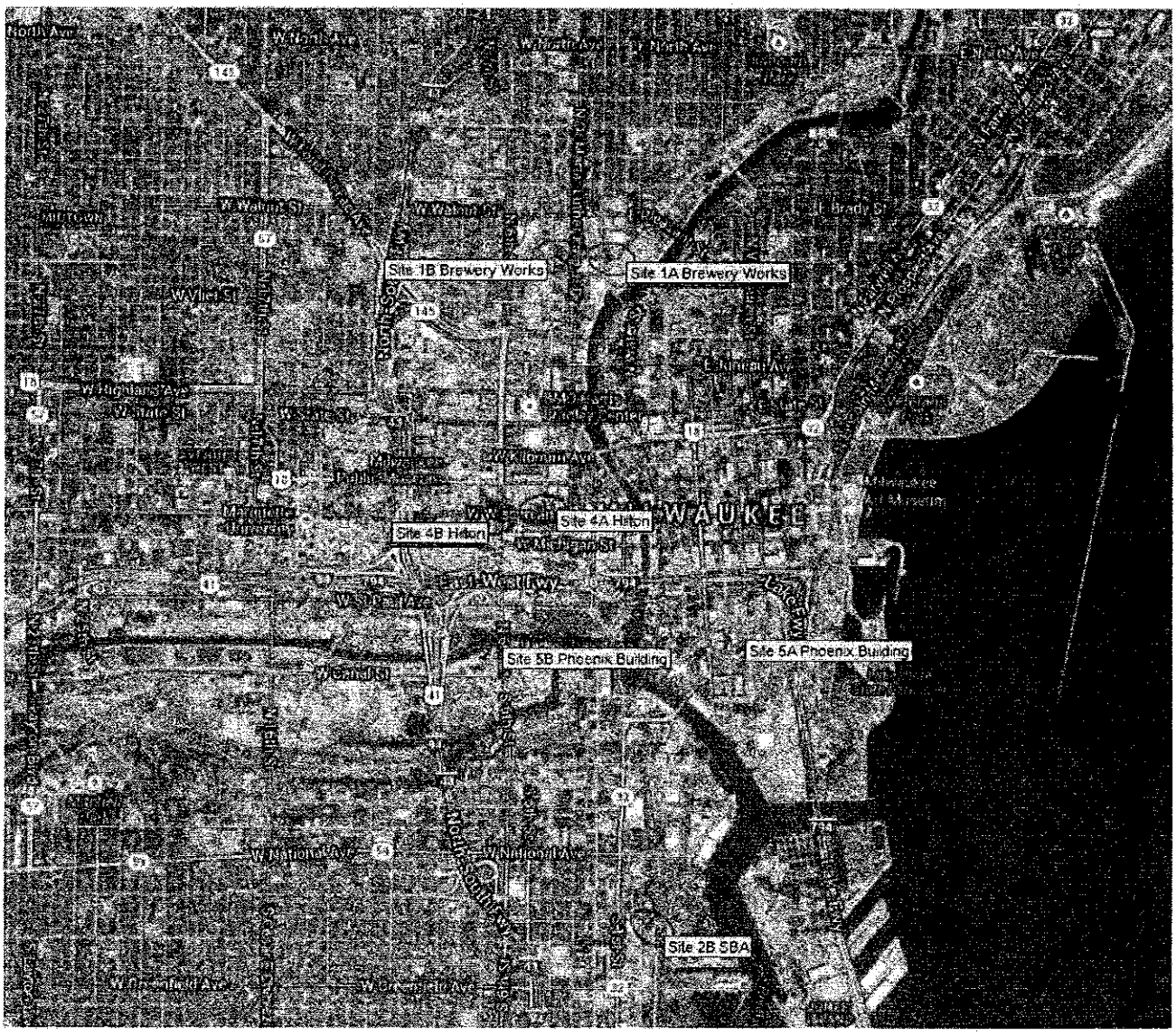
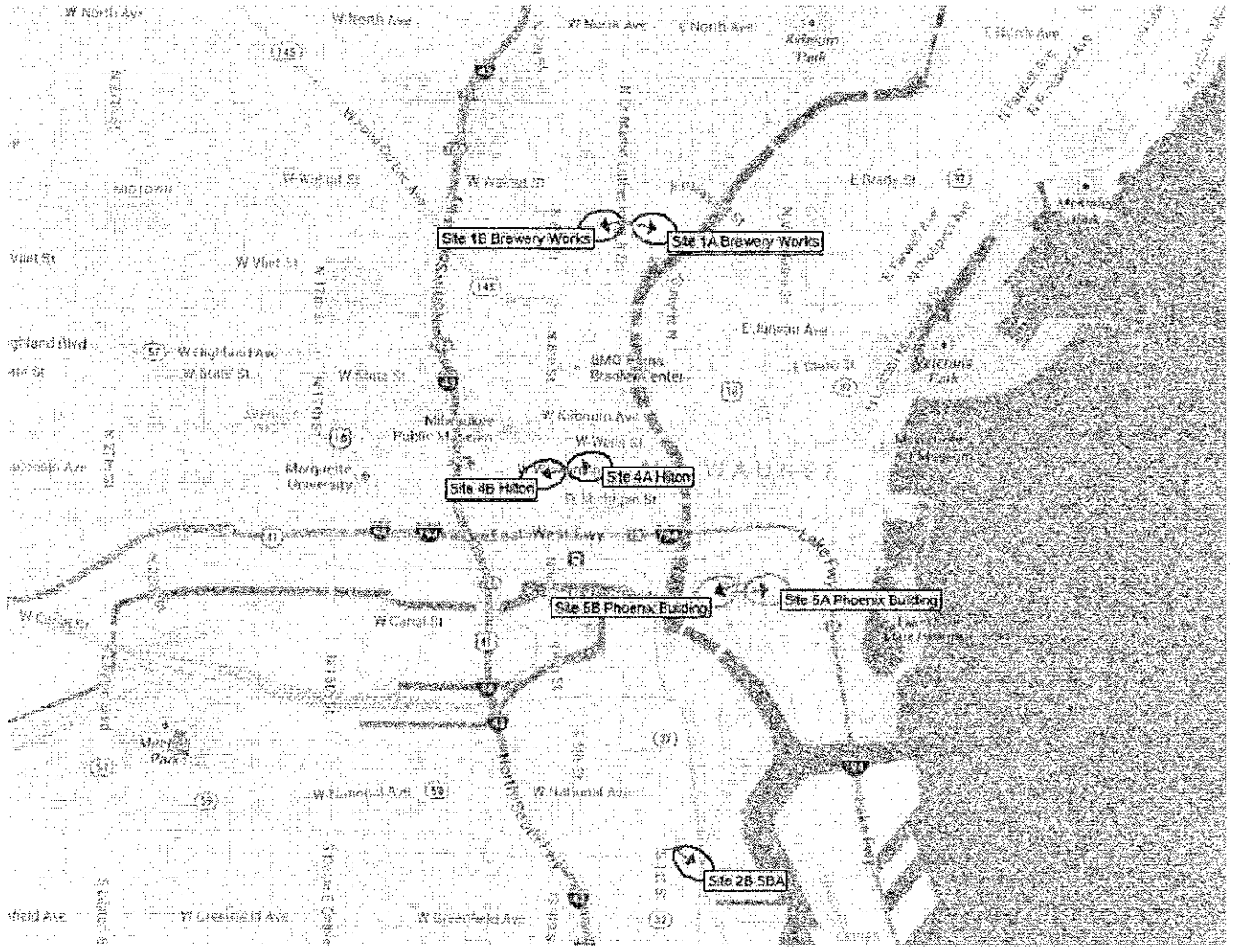


Figure 2: Milwaukee Transmission Locations Street Map View



DRIVE TEST LOCATIONS

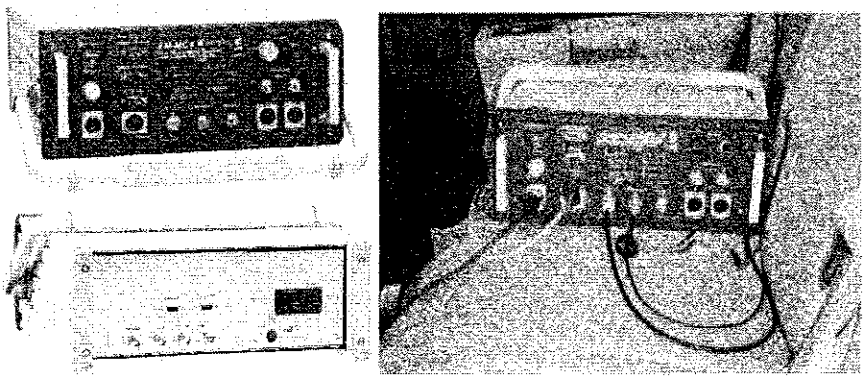
Drive tests were located inside the ZoneCasting Zone, were selected to be within the Transition Area, and in the Main WIIL(FM) service area were to collect RF signal and audio quality measurements. The main focus of the test was to measure and record audio performance as the receiver physically passes thru the Transition Areas.

TEST MEASUREMENT EQUIPMENT

An Audemat-Aztec FM-MC4™ was used to collect the audio samples in the field. The FM-MC4 is a professionally calibrated FM receiver with a GPS receiver, and all the measurements are automatically logged. It is an FCC approved calibrated receiver supplied with a calibrated antenna.

GoldenEar™ is a software product which is used with the FM-MC4 Measurement Receiver. It is intended to evaluate the overall quality of an FM station reception through signal measurements and audio recording.

Figure 3: Audemat FM-MC4™



The FM-MC4 enables the following main operations to be carried out on a FM audio signal:

- Quantifying the signal value constituting the Base-band MPX signal
- Quantifying the MPX signal's power value
- Quantifying the demodulated signals' value constituting the audio message
- Ensuring different processing of these quantifications (corrections, averages, statistical calculations, phase, synchronization)
- Ensuring different representations of these quantifications.
- The FM-MC4 measurement receiver is also acquires raw data from the FM broadcasting station. These signals are read in digital form through the PC interface such as the RF level

From these raw signals, several calculated signals are deduced:

- RF level

- Multipath ratio
- MPX exceeding (over nominal level)

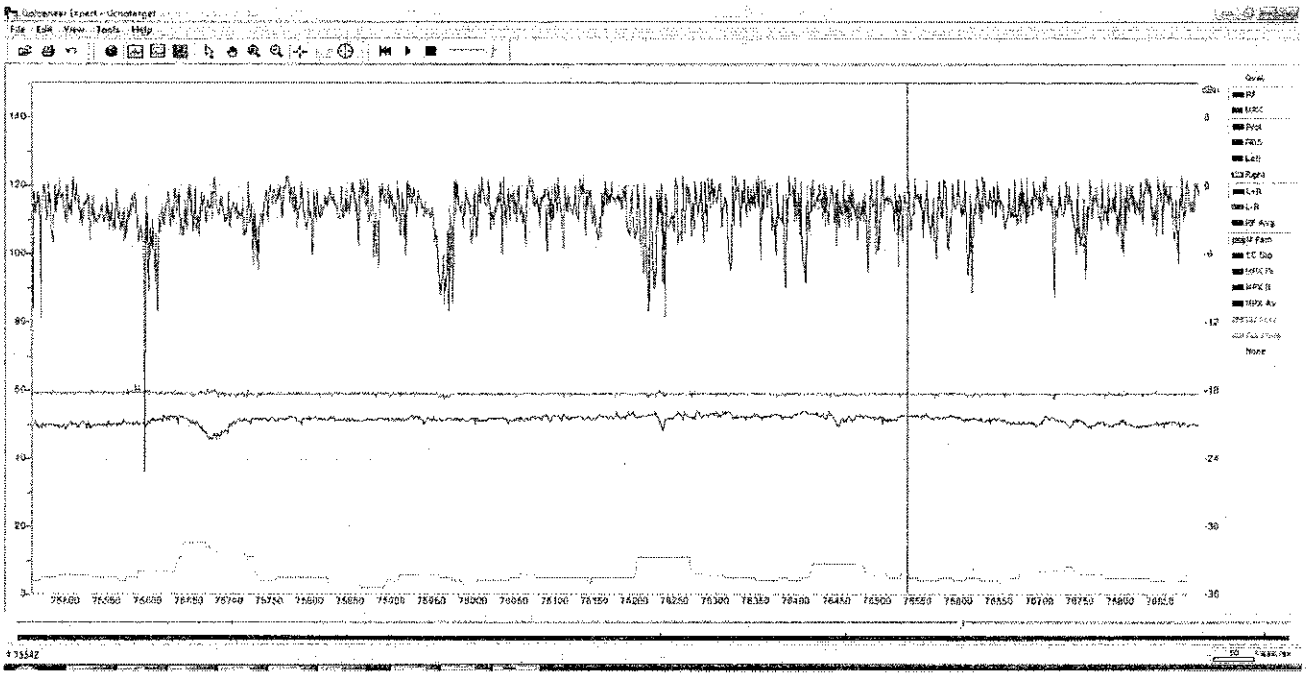
The first signal processing is done within the FM-MC4. The signal under test is the Multiplex signal whose format is defined by a pass-band of 100 kHz. This analog MPX signal is converted into a digital value using an A/D converter. Sampling frequency is fixed at 256 kHz, which guarantees quantification of any signal up to theoretical maximum deviation of 128 kHz. For subjective listening the audio output of the receiver was recorded digitally in a (CCIT 22.050 kHz, 8-bit) WAV file format by the GoldenEar™ software.

For conversion of the Absolute field (dBμV) into a Relative field (dBμV/m), several calibrated files are supplied with the FM-MC4, including: K coefficient validation, RF Antenna and Cable validation, and Loss and Gain validation. Appendix One contains details on these files.

The GoldenEar software is meant to provide a numerical method for quantifying a pure subjective concept, which is quality of received FM audio. As the method is a numerical one, it will be applied every time the same way, therefore it is an objective measure, as opposed to having numerous subjects listen to and evaluate the audio.

An example graphical output is shown below, indicating RF level (Green), Pilot Stability (Dark Blue), Multipath Ratio (Grey), and L+R (Light Blue), for a portion of a stationary PSA measurement recording.

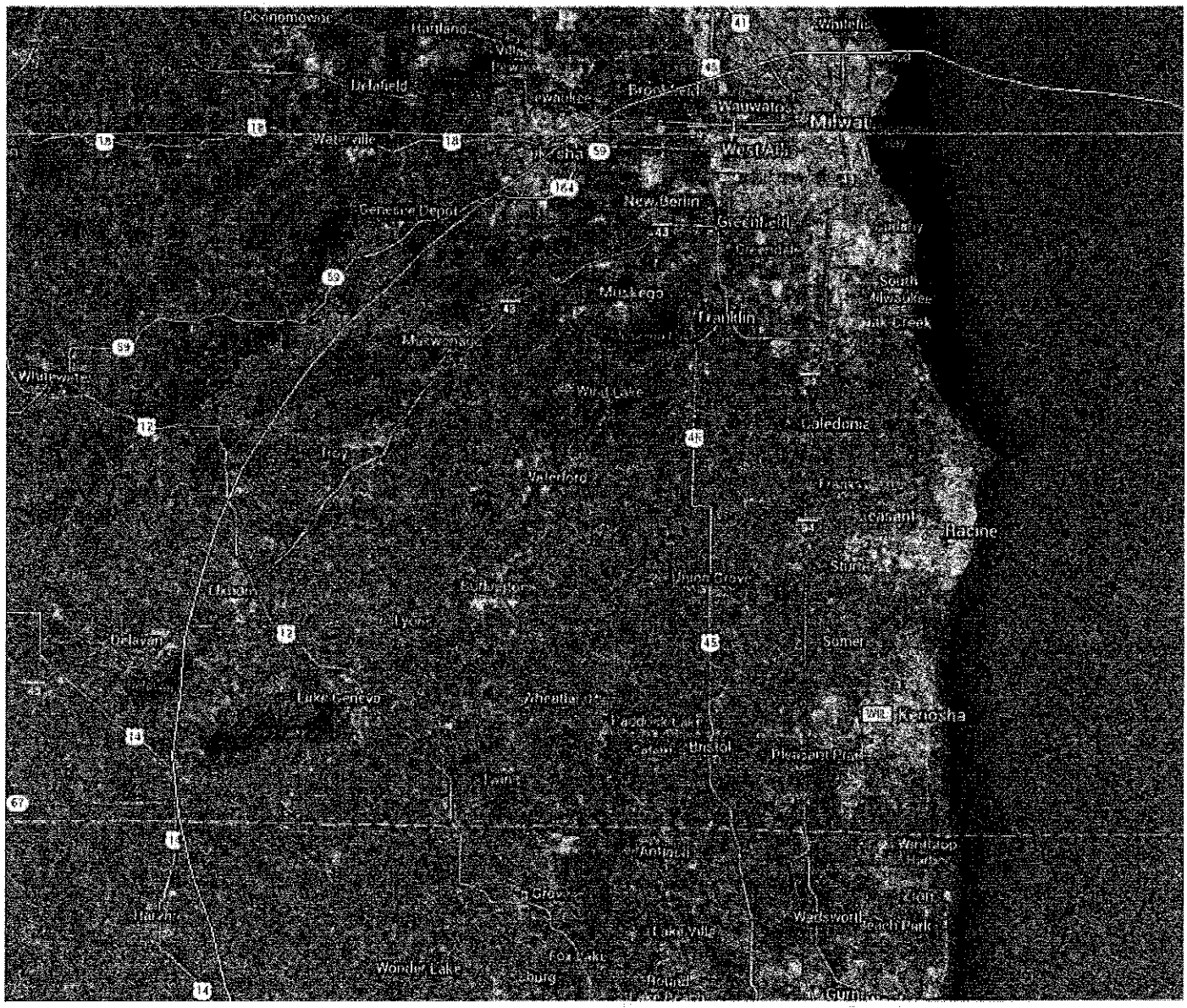
Figure 4: GoldenEar™ Signal Display



RF MEASUREMENT RESULTS

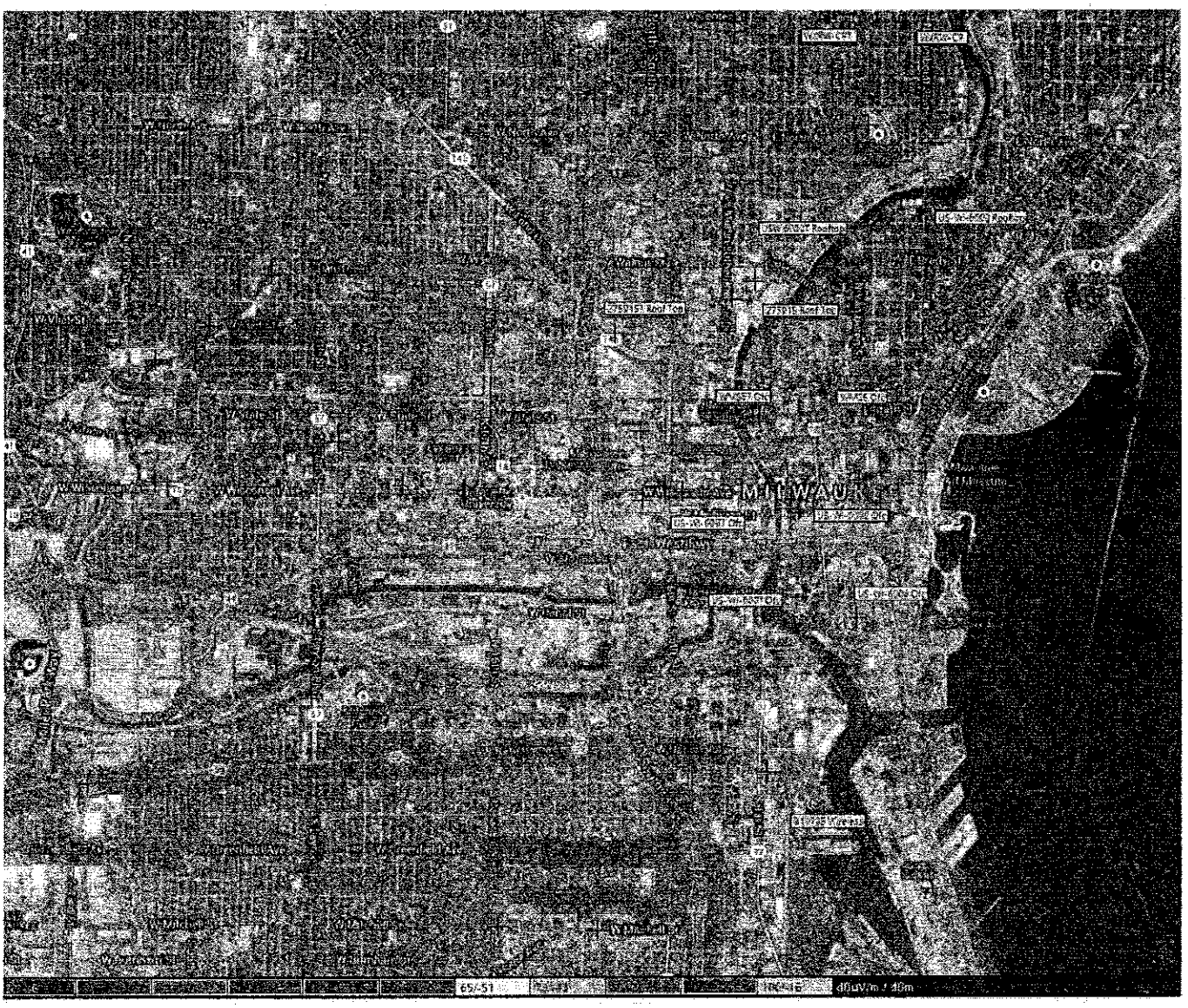
The RF propagation of WIIL(FM) was accurately measured and the data collected was used to tune the RF propagation model. The 54 dBu Service Area for WIIL(FM) is shown below.

Figure Five: 54 dBu Service Contour for WIIL(FM)



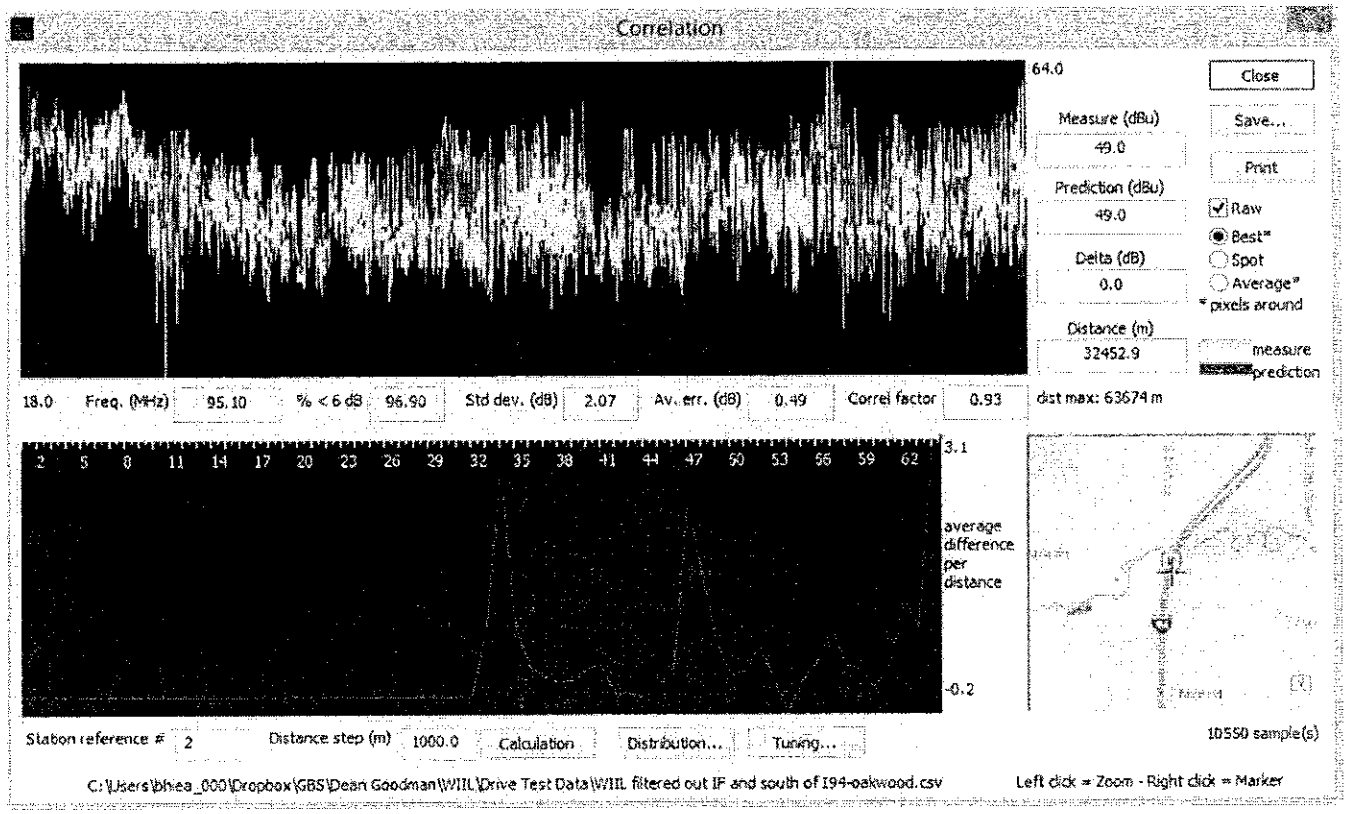
The area of data collection and relative signal strength is indicated in the following figure.

Figure 6: RF Propagation Measurements for WIIL(FM)



The above mapped measurements were imported into the GBS propagation model, generally based on the International Standard ITU-R 525/526 with sub-path attenuations. Given the 10 meter terrain and clutter data, an accurate model was constructed after only a few correlation analyses which optimized the propagation model parameters. Over the drive measurement route, 10,550 samples of signal strength were made. It should be noted that the signal strength of the primary station in the test area without the assistance of boosters is actually well below 54dBu and is of marginal quality due to the urban nature of the downtown Milwaukee area.

Figure 7: WIIL(FM) Final Correlation Analysis



The final prediction model had an average error of 0.49 dB and a standard deviation of 2.07 dB, with 96.9% of all samples recorded within a 6-dB window from the mean. This provided a highly accurate model for use in booster design and placement. The following figures indicated the post corrected coverage prediction for WIIL(FM), with 39 dBμV/m used as a threshold.

Figure 8: WIIL(FM) Post Corrected Coverage Prediction

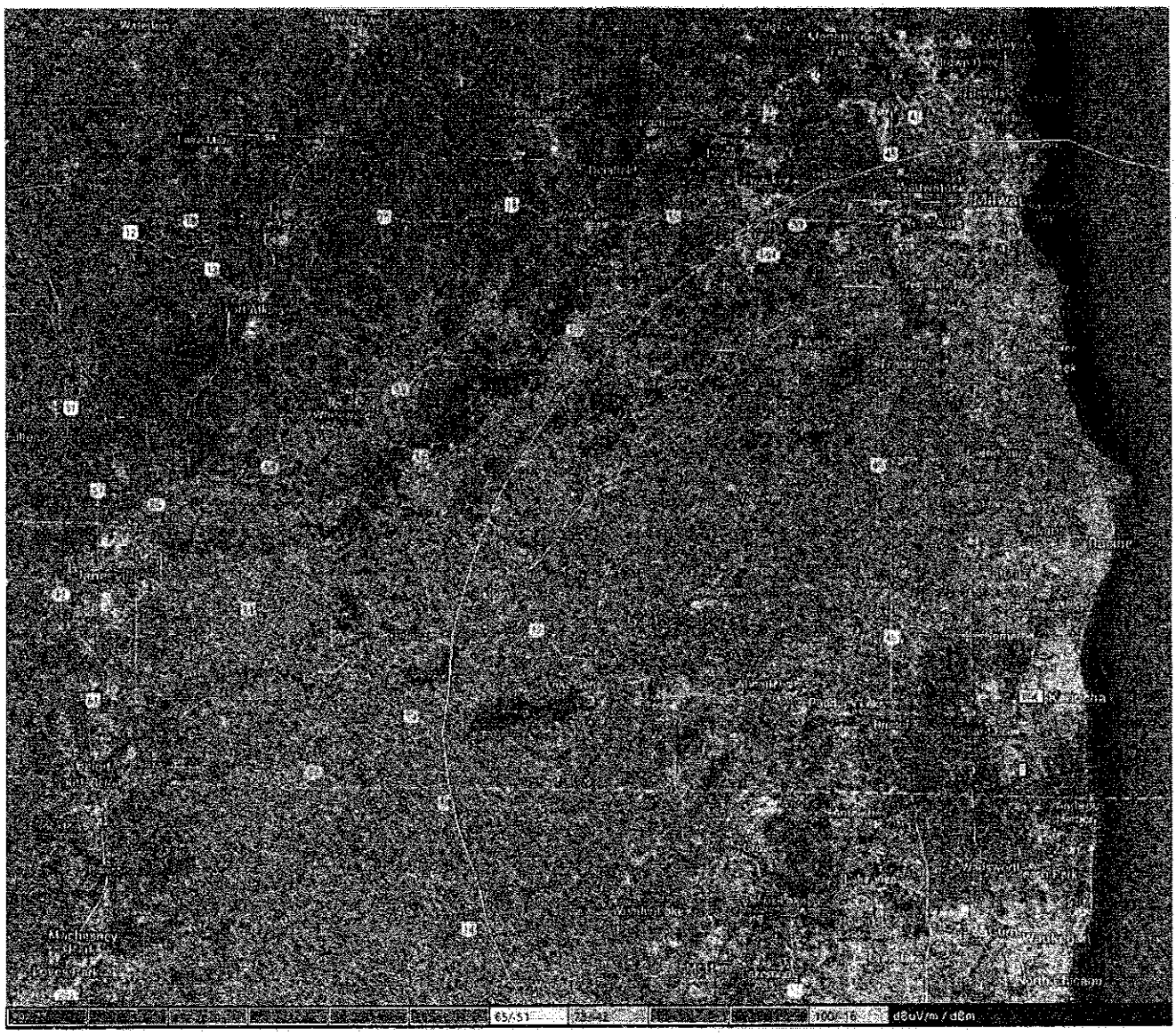
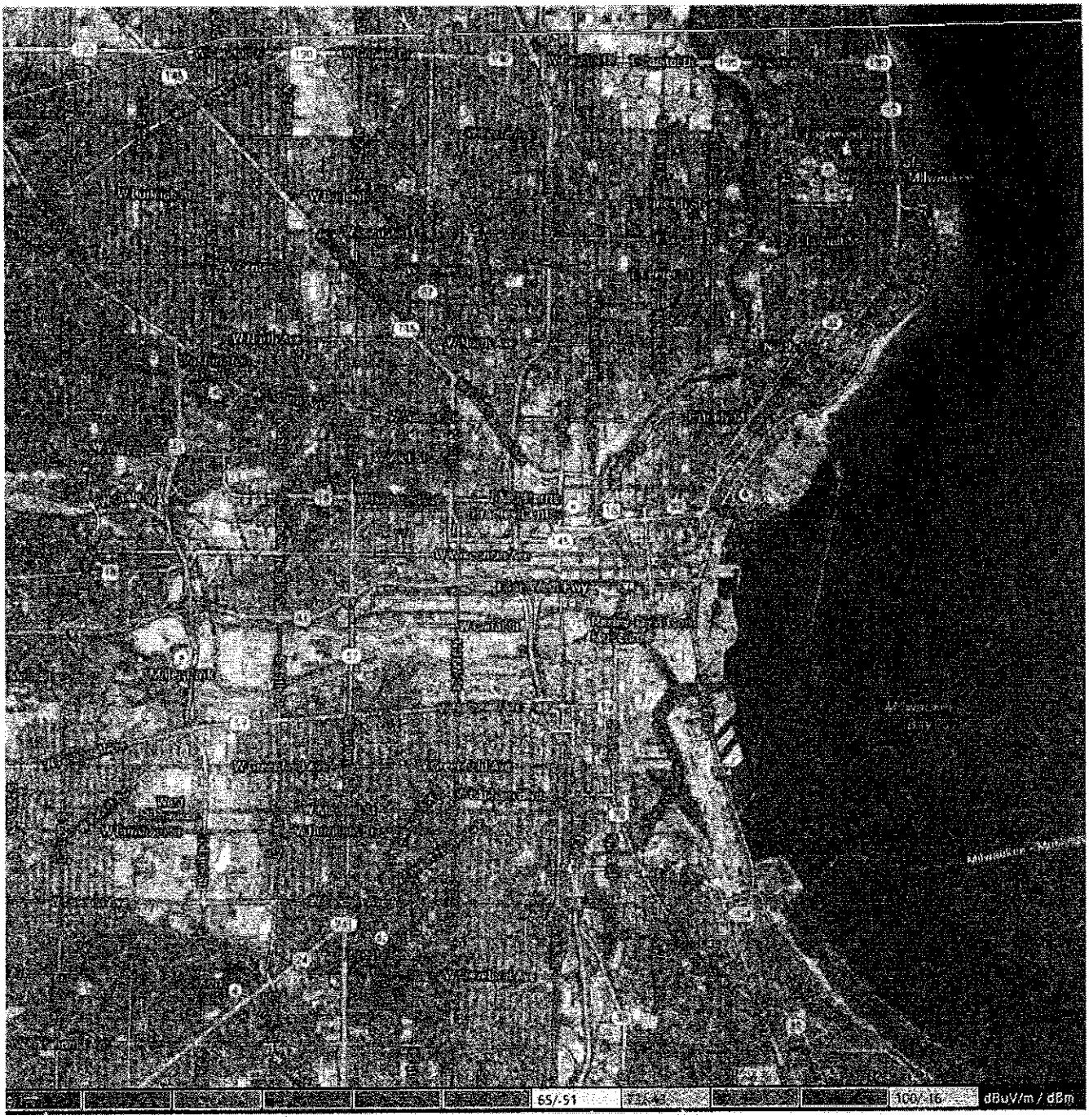


Figure 9: WIIL(FM) Milwaukee Area Post Corrected Coverage Prediction



BOOSTER NODE DESIGN

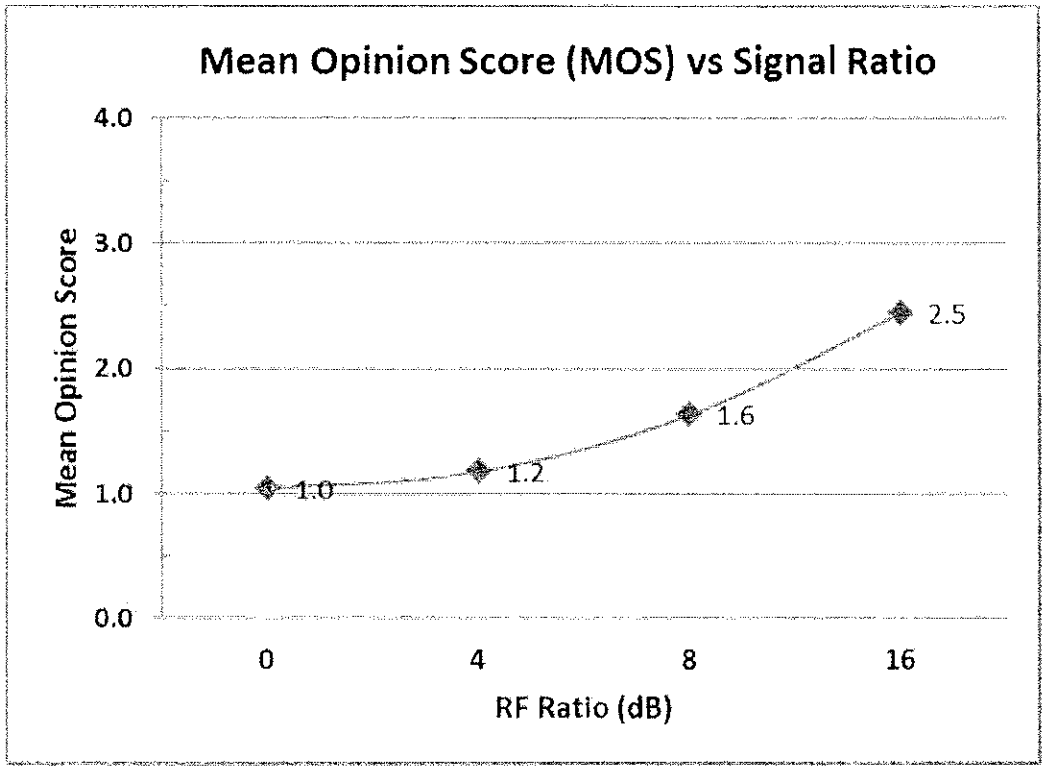
Given the measured and correlated WIIL(FM) main signal, booster locations were then chosen. As mentioned, four locations with seven transmitters were chosen, with a number of the transmitters used to improve the C/I ratios by simulcasting the main WIIL(FM) signal, same content.

In the listening tests conducted by NPR Labs and Towson University, several criteria were considered.

- Listeners evaluated
- Mono and Stereo modes
- Speech, music, voiceover
- Time-of-arrival between signals
- RF ratios between signals
- Listener participants were asked to rate the audio paralleling ITU-R five-grade impairment scale
- (1=bad, 2=poor, 3=fair, 4=good, 5=excellent)

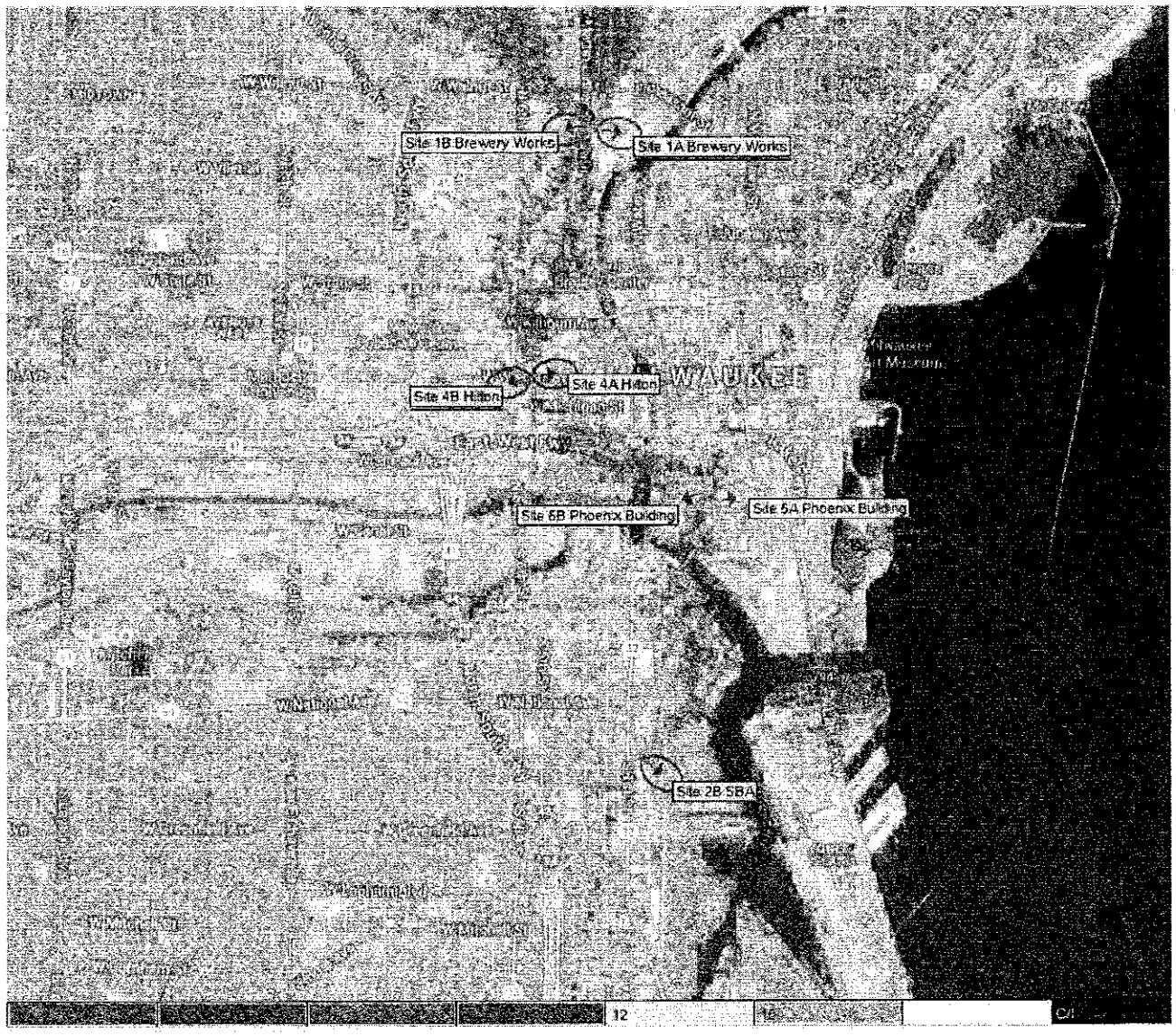
For ZoneCasting spots in Mono, the average minimum threshold for acceptability was found at approximately 16 dB C/I, at a MOS score of 2.5, under mobile multipath fading conditions. Appendix Two provides more information about the listening tests.

Figure 10: C/I Design Parameters



Given the 16 dB C/I design requirement, a predicted area of the Milwaukee zone is designed, with predicted transition area interference indicated in the color-coded areas in the below figure (those areas with a C/I from 0 to 16 dB). Drive tests throughout the both the ZoneCasting area, the main signal area, and transition areas were performed.

Figure 11: Pre Measured C/I Prediction

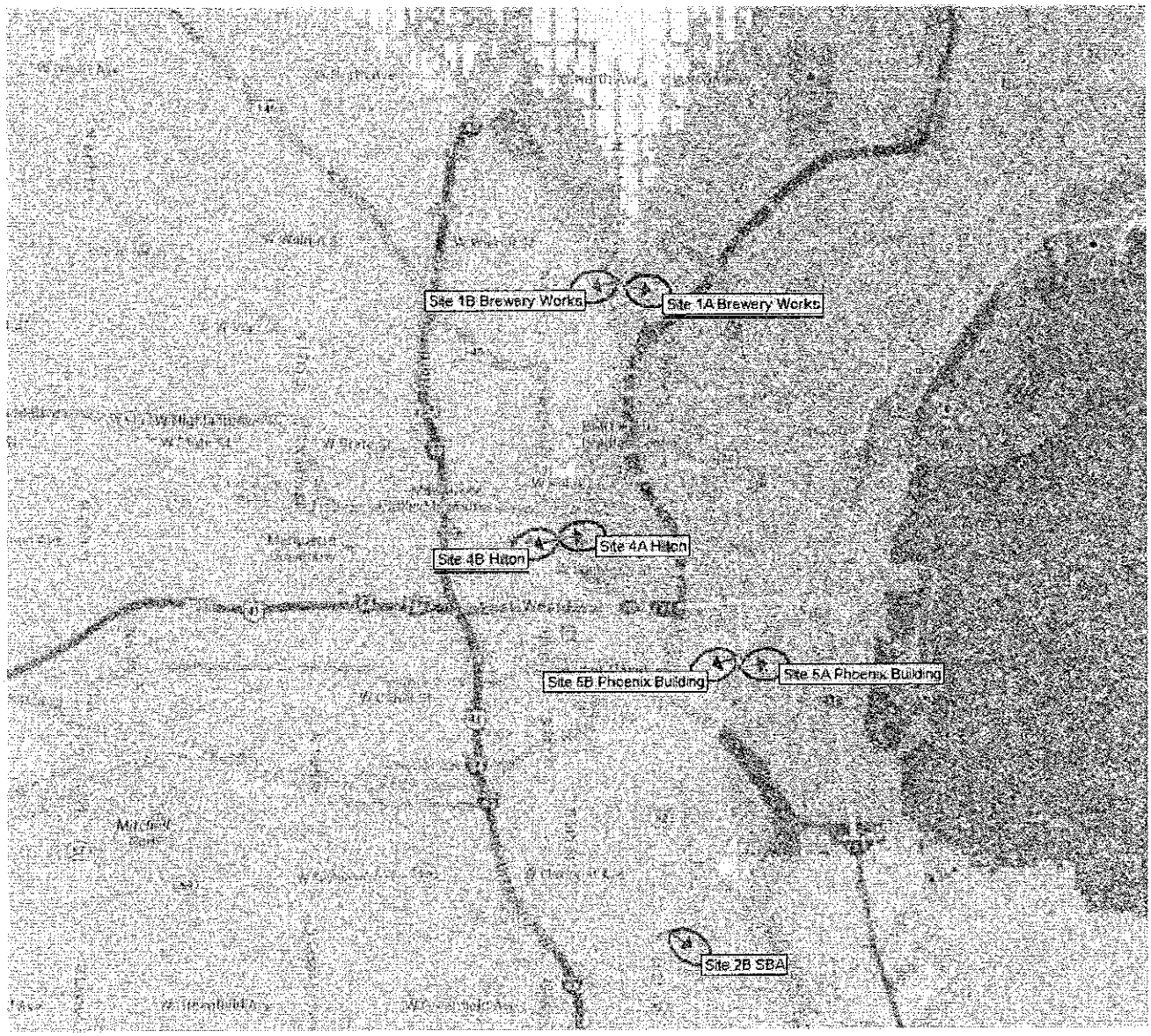


Transition zone interference is designed to occur over water, rivers, parks, and other low listening areas as much as possible.

Zone Boundary Definition

Given the predicted C/I values, an approximate ZoneCasting Zone area can be predicted, with the Main Zone represented in Red, the ZoneCasting Zone represented in Green.

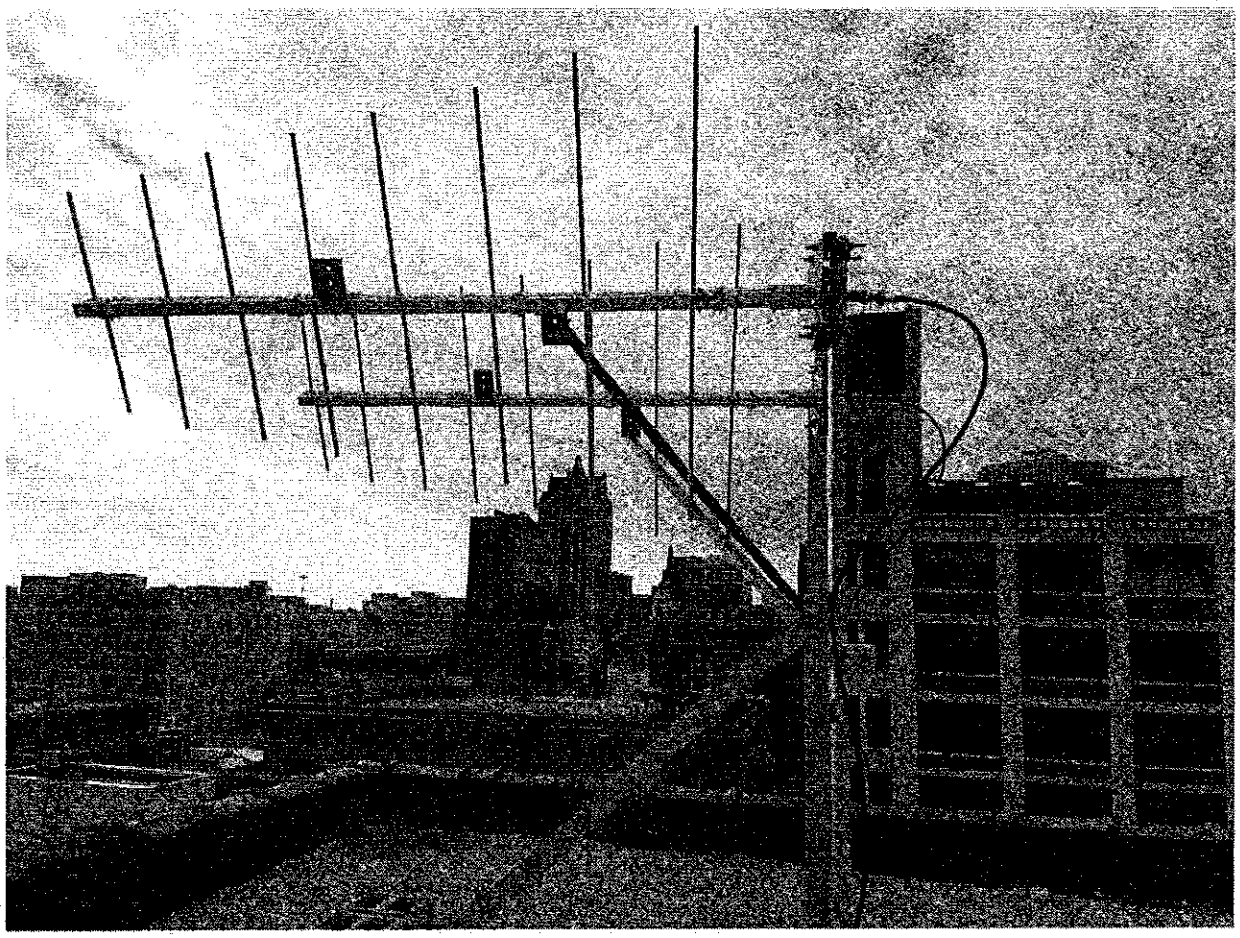
Figure 12: ZoneCasting Zone Area Approximate Boundary



BOOSTER NODE CONSTRUCTION

Four RF Sites locations, with Seven RF transmitters/antenna arrays were used in the test. All sites used GatesAir Flexiva™ FM transmitters, IPLink200s with Synchrocast® distribution equipment, a private MPLS IP and point-to-point wireless data network for distributing the audio, and GPS for time synchronization and frequency stability. The Antenna Arrays consist of Shively 6025 Log Periodic antennas, slanted at 30 degrees' rotation. The "B" sites rebroadcast the Main WIIL(FM) signal, and the "A" sites broadcast different content (PSA announcements). A typical antenna configuration (Phoenix Building node) looks like the following:

Figure 13: Typical ZoneCasting Equipment Configuration



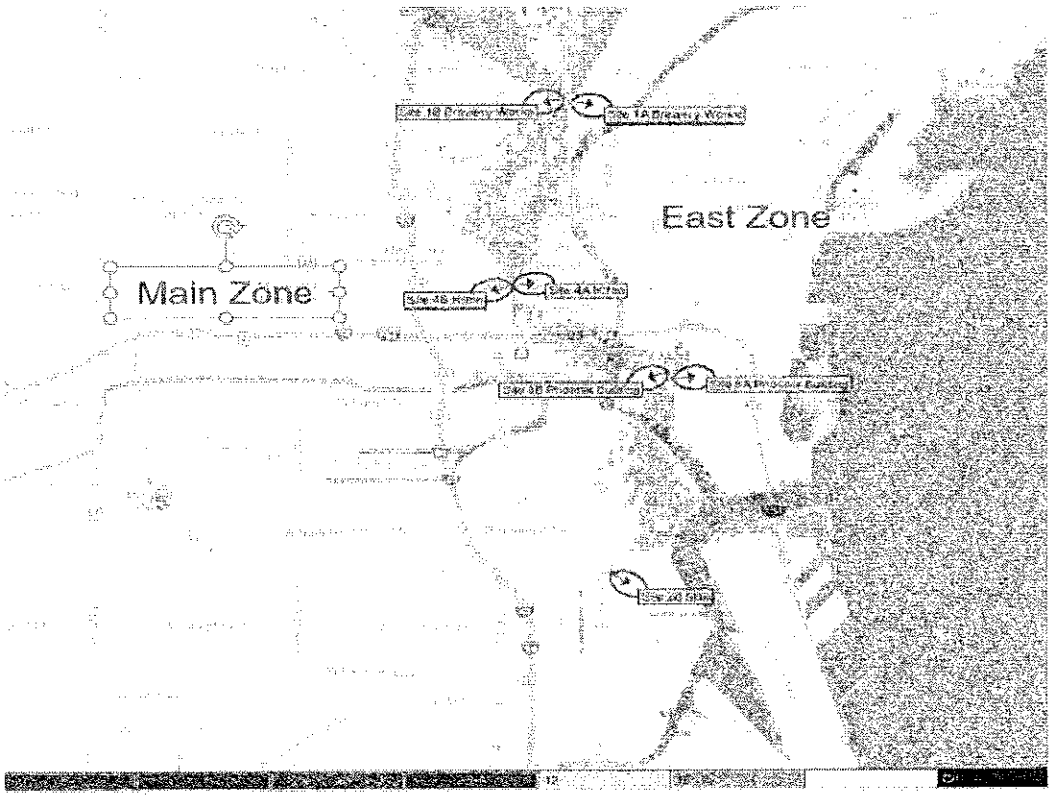
RF ANALYSIS OF THE TEST AREA

Because of the booster placement, optimized for population coverage and terrain, the objective is to determine if the implemented targeted messaging correlated well with the substantial amount of RF engineering performed on this test. Routes and audio recordings thru the Transition areas are shown.

Drive Test Routes

Drive tests thru the transition zones, where a transition from the Main zone to the East zone were performed. The Main zone broadcasts identical content as the Main WIIL(FM) transmitter, and each Main zone booster node are synchronized together with each other and the Main. The East zone broadcast different content (PSA spots) than the Main transmitter, and each East zone booster node are synchronized together with each other.

Figure 14: Transition Zone Drive Test Areas



Samples of the audio along the drive route, approximately 45 seconds of each, is presented along with this report in a Power Point presentation where the audio can be played with a 'point and click'.

Table 2: Drive Test Transition Routes

Route	Area and Audio File	Transition Occurs
Main to East	Near Brewery node on Cherry Street Brewery-transition.mp3	12-23 sec
Main to East	Near Hilton node on Wells Street milwaukee_Wells-transition.mp3	22-24 sec
Main to East	Near Phoenix Building Node on St. Paul Street Phoenix_st-paula-transition.mp3	23-30 sec

Figure 15: Brewery Node Transition Zone Drive Test

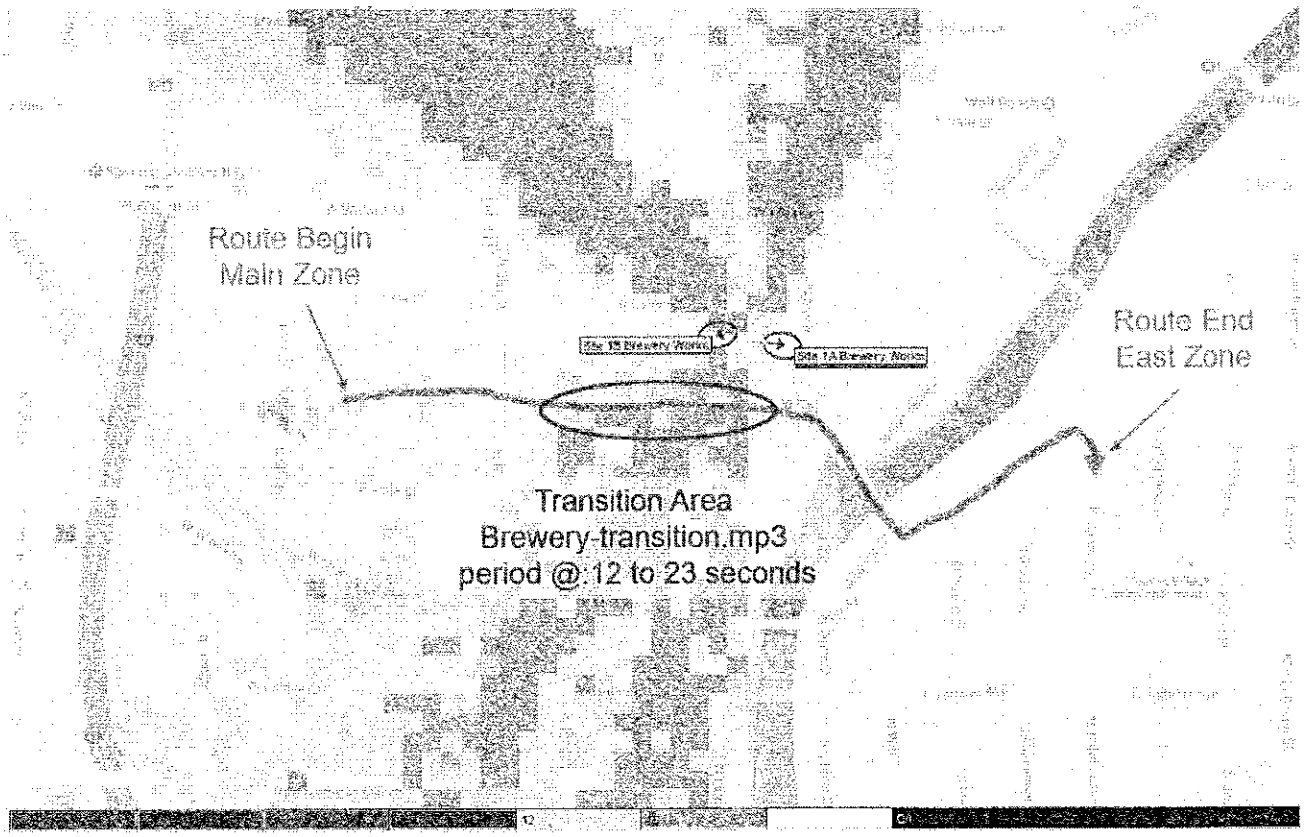


Figure 16: Hilton Node Transition Zone Drive Test

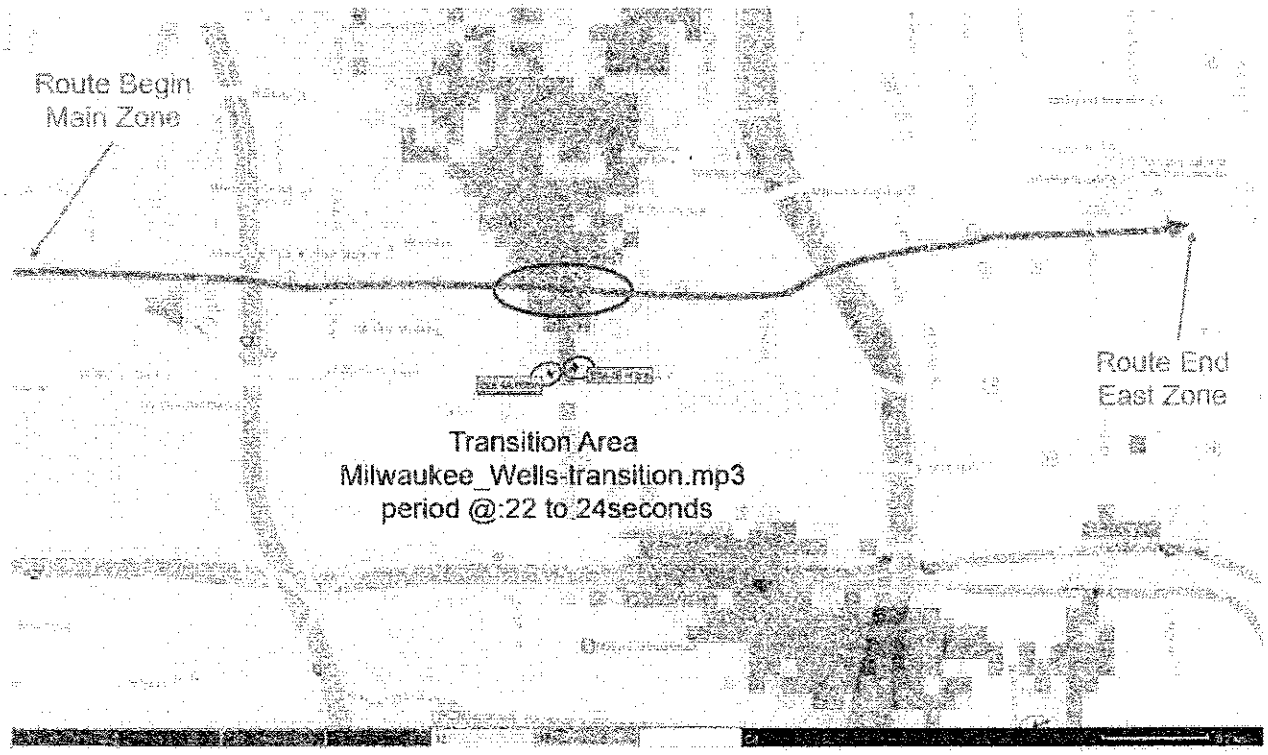
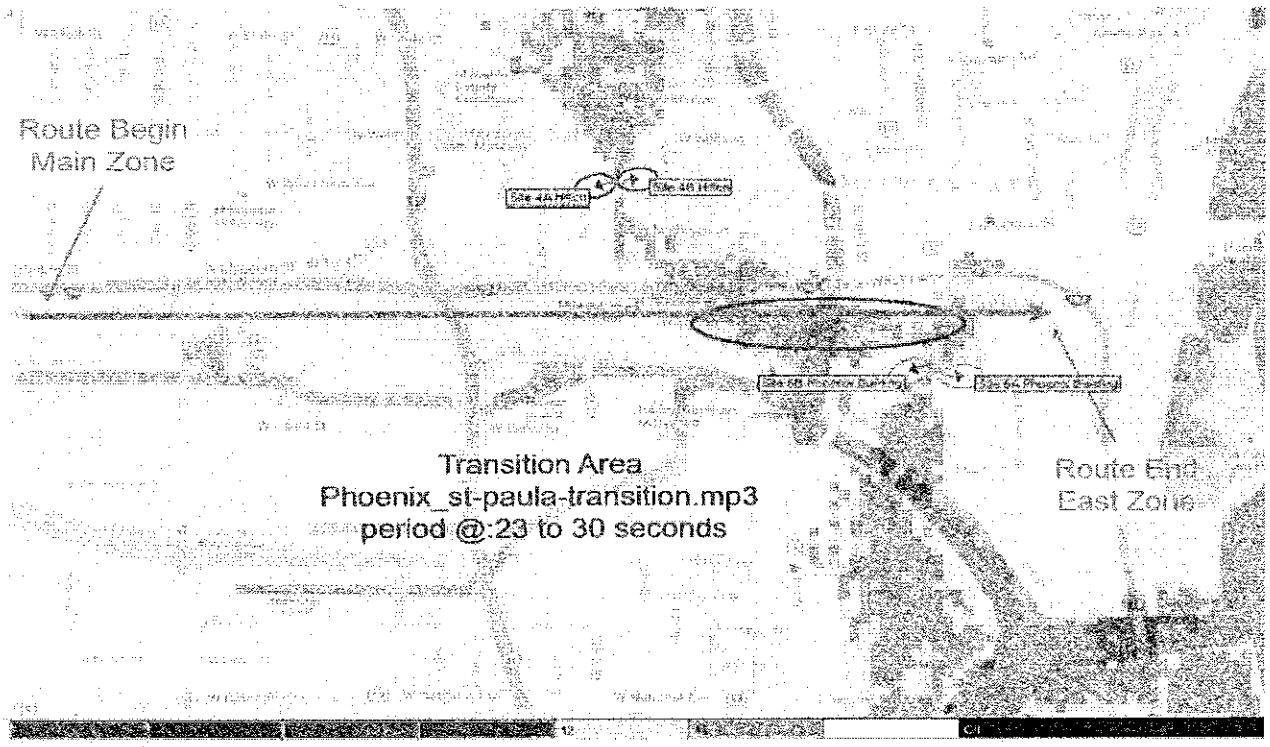


Figure 17: Hilton Node Transition Zone Drive Test



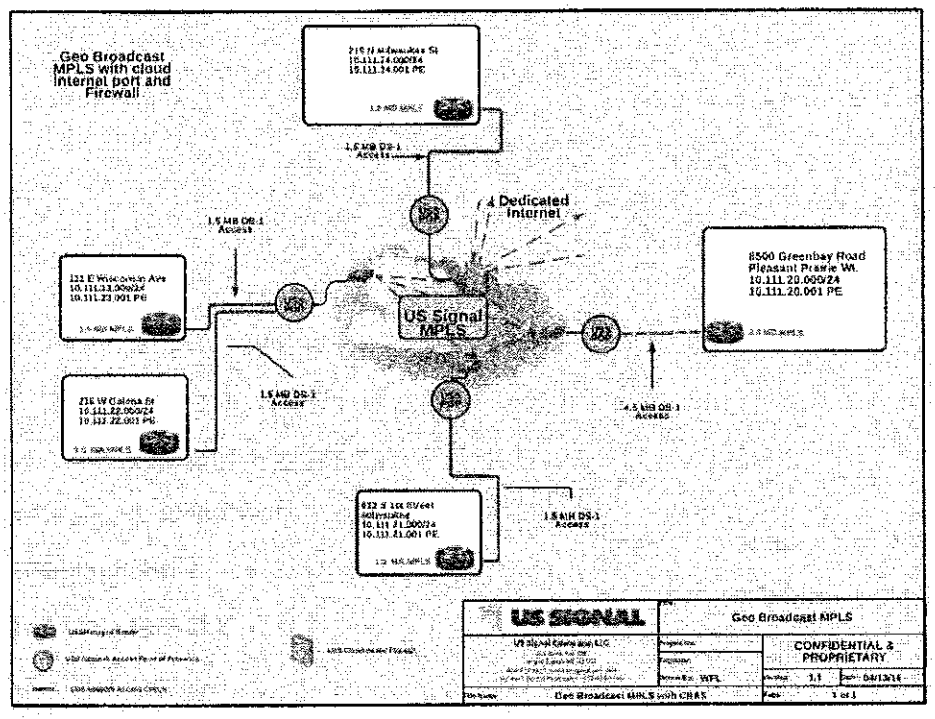
NETWORK INFRASTRUCTURE AND TARGETED SPOT INSERTION

AUDIO DISTRIBUTION NETWORK

Because this network was constructed from the ground up, on building top and tower co-locations, a method of sending distinct audio messages to the boosters was needed during both the simulcast Non-Targeted and Targeted spot times. This was accomplished using multiple audio streams. Two modes of operation were implemented in regards to spot insertion: One involves simulcasting, on the booster node network, the exact same spot as the main (WIIL(FM)) was broadcasting, the second was to simulcast a different (targeted) spot than the main was broadcasting. The goal is to determine relevant differences in audio quality during a receiver transition between the two zones, as this was the main goal of the testing.

Audio distribution from the Main WIIL(FM) Studio was achieved primarily with a U.S. Signal private MPLS network. The only exception to Figure 18 is that the audio distribution to the Brewery Node was achieved with a wireless link from the Hilton site, as there were problems with circuit extension at the Brewery Node.

Figure 18: MPLS Audio Distribution



ANALYSIS AND RATING OF THE AUDIO AND EFFECTIVENESS OF TARGETED SPOT DELIVERY WITH BOOSTERS

AUDIO SAMPLE RECORDINGS

In the WIIL(FM) service contour, the seven booster nodes create two coverage areas, in terms of RF isolation and segregated markets. Distinct Public Service Announcements (PSAs) were tested in the East zone as each market area was playing a different spot at the same time. For WIIL(FM), radio spots (non-commercial and commercial) start generally 3 times each hour. The test PSAs were 30-60 seconds in length each, and occurred up to 3 times per hour depending on spot availability.

Final zone transition testing occurred on 12/12/2016 to 12/14/2016. It is important to mention that 15 minutes or 30 minutes elapsed between spots, so drive distances had to be determined- typically 2-4 miles apart, and compensated by roads, construction delays, and alternate routes for high traffic or

accidents. Typical test locations were on a west to east drive route so that the Main Zone, the Transition Area, and East Zone audio can all be listened to in one audio file.

At each of the measured transition route locations, each audio file attached with this report has the following format:

- Approximately 45 seconds in length.
- 15-20 seconds of audio before the Non-Targeted spot in the Main Zone.
- 2 to 11 seconds of transition audio.
- 15-20 seconds of audio of the Targeted PSA spot in the East Zone.

This format allows the listener to easily compare subjectively the Non-Targeted PSA reference spot audio to the Targeted spot audio.

From the reference audio, it is demonstrated that creating targeted, single frequency network (SFN) zones are achievable, even in relatively flat terrain with areas of high urbanization and high population densities.

It should be noted that this system was designed and constructed for concept and viability purposes for ZoneCasting. This is the third ZoneCasting test that has been presented to the FCC. The previous two tests were deemed acceptable. This third test successfully incorporated receiver mobility into the test plan.

Conclusion

Throughout the series of three experimental authorizations, GBS has continued to learn from testing and development of the ZoneCast design and implementation. GBS has refined the propagation model and interference prediction model with field tests using the Audemat FM-MC4 Measurement

Receiver and the Audemat "Goldenear" software to objectively quantify the interference zones, adjusting as necessary to improve performance and predictability.

GBS has unequivocally proven in this most recent testing the technical viability of using alternate programming material on boosters in designated zones to augment the information available to listeners in those areas. The test results have consistently proven that in a properly designed system, with multiple closely spaced booster "nodes", significant benefit can be derived in the designated ZoneCast areas while minimizing interference. Drive testing conducted during the experimental operation of WIIL (FM) has proven that while physics dictates that there will be some transition area which will contain undesirable artifacts, that area can be minimized to exist within only a few city blocks and take only a negligible amount of time to transverse in a mobile environment. This transition zone, based upon measurements, is likely to produce minimal listener "tune-out". Further, the benefits of the fully synchronized booster nodes during simulcast periods (which comprises the vast majority of the broadcast day), is likely to enhance listenership by increasing signal strength in many downtown buildings to that well above the signal strength otherwise available from the main transmitter alone.

After five years of testing and refinement of the Zonecast system, technical improvements and the art of implementation have progressed to the point where GBS believes it has been demonstrated that in both fixed and mobile environments, the public interest would be served by having targeted segmented ZoneCast programming available. GBS respectfully requests that, pursuant to the Rulemaking Request filed by GBS, 47CFR 74.1231(i) should be modified to allow for signals other than that of the primary station to be broadcast on boosters.

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APPENDIX ONE

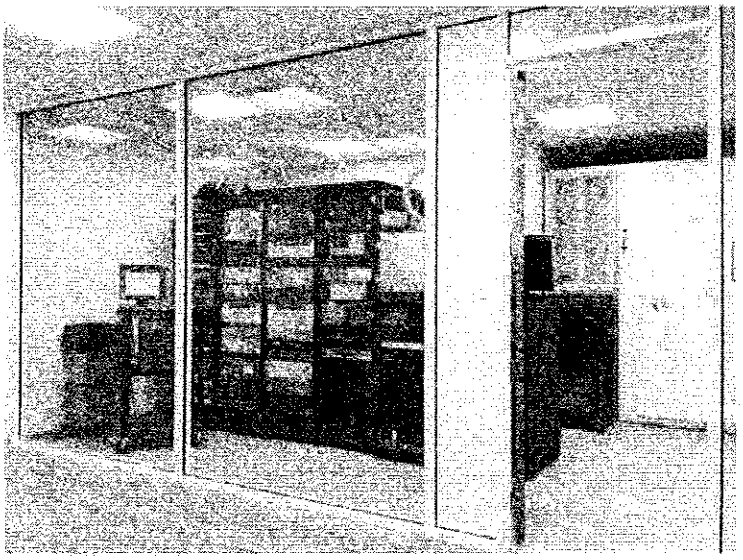
APPENDIX TWO : NPR LABS/TOWSON UNIVERSITY RESEARCH DESCRIPTION

NPR Labs (National Public Radio) Research

- Research Goal:

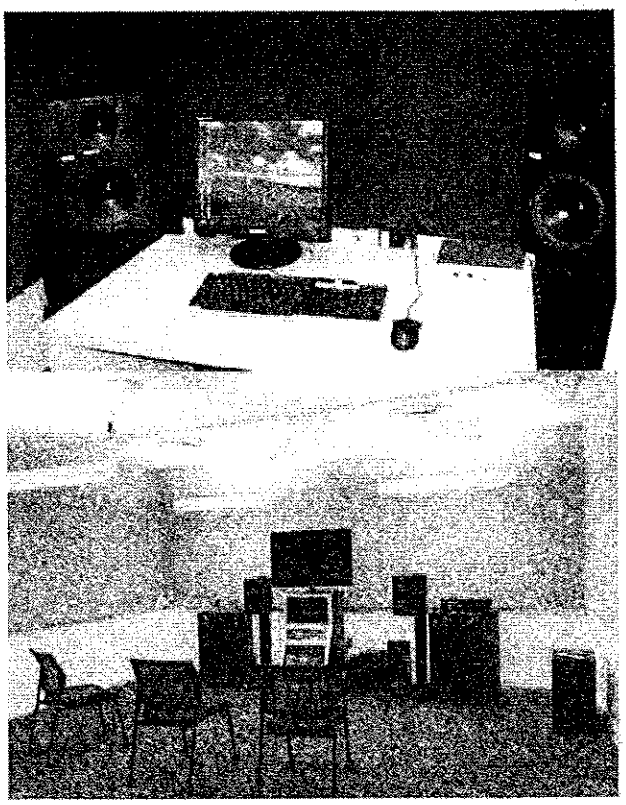
  Create Standardized System Design Criteria for Geo-Broadcast Solutions: MaxxCasting™ and ZoneCasting™ Networks

- RF Lab Simulations of Main Transmitter and MaxxCasting™ ZoneCasting™ Configurations
  - Both mobile (Rayleigh / Rician) multipath fading & fixed signals
  - Process audio with professional broadcast hardware
  - Received with standard consumer car and home radios

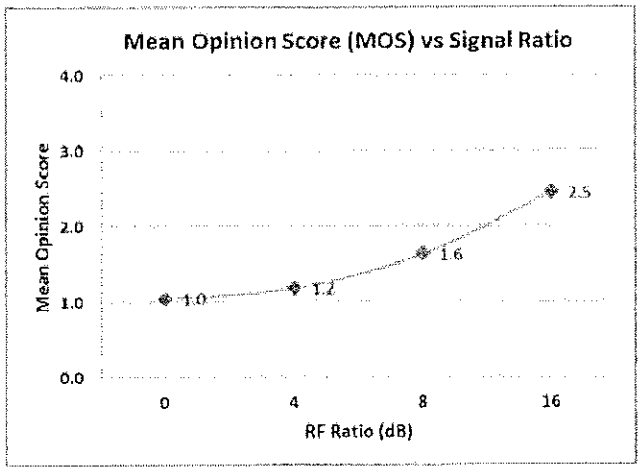


Geo Broadcast Solutions-NPR Labs Research

- Listener Tests
  - Measure consumers' opinions of ZoneCasting™ design parameters
  - Conducted at Towson University and designed by Dr. Ellyn Sheffield
  - Testing was held in two 7x8' rooms, set up to simulate a home listening environment and an automobile cabin
  - Listener keep-on, mean opinion scores recorded
  - 19,000 data points



Geo Broadcast Solutions-NPR Labs Research



- Listeners evaluated
  - Mono and Stereo modes
  - Speech, music, voiceover
  - Time-of-arrival between signals
  - RF ratios between signals
  - Listener participants were asked to rate the audio paralleling ITU-R five-grade impairment scale
    (1=bad, 2=poor, 3=fair, 4=good, 5=excellent)
  - For ZoneCasting spots in Mono, the average minimum threshold for acceptability was found at 16 dB C/I, at a MOS score of 2.5, under mobile multipath fading conditions.

APPENDIX THREE : FCC EXPERIMENTAL AUTHORIZATION

To be provided.

APPENDIX FOUR : REFERENCE STANDARDS RELEVANT TO THIS REPORT

FCC AUDIO DIVISION
http://www.fcc.gov/mb/audio/
The Media Bureau licenses commercial and noncommercial educational AM, FM, FM Translator, and FM Booster radio services, and also the noncommercial educational Low Power FM radio service. The Division provides legal analysis of broadcast, technical and engineering radio filings and recommends appropriate disposition of applications, requests for waivers, and other pleadings. Telecommunications falls under **Title 47** of the CFR. AM, FM, and TV broadcast stations fall under **Part 73 and 74** of Title 47.

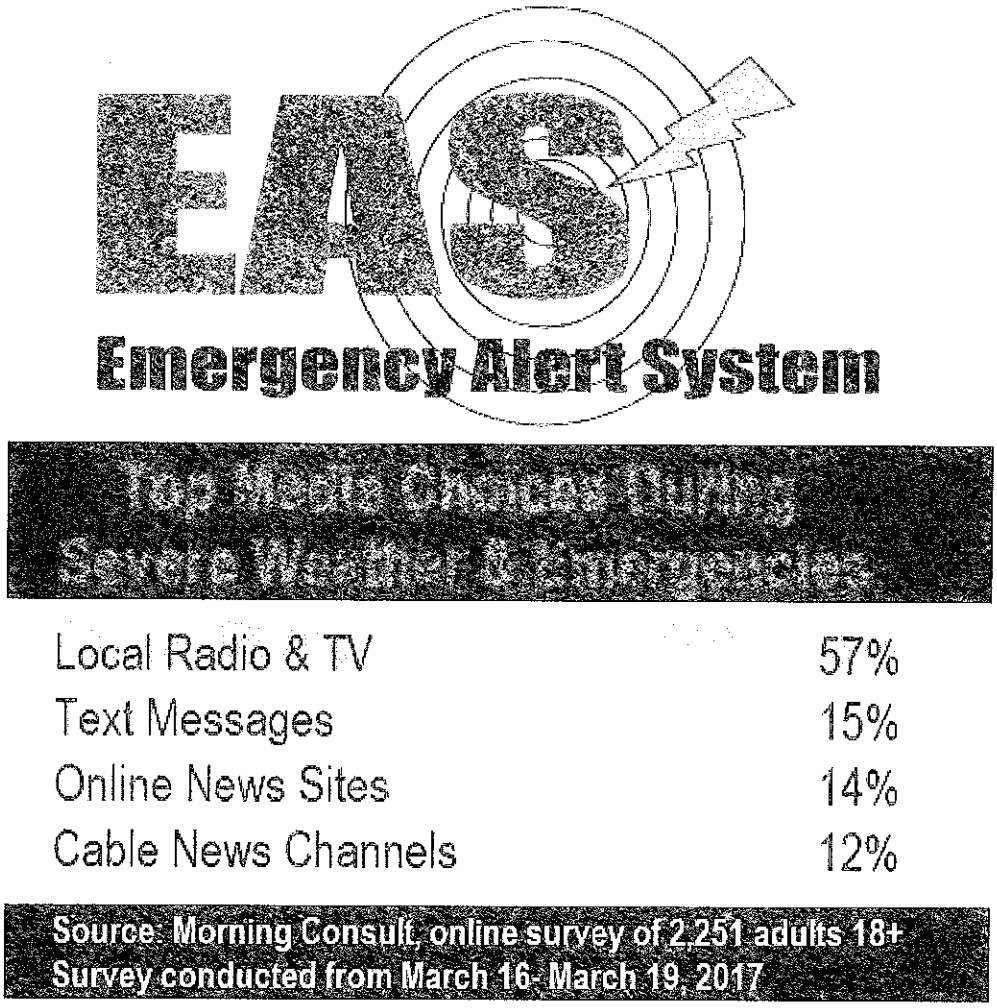
INTERNATIONAL TELECOMMUNICATIONS UNION (ITU)
ITU Radiocommunication Sector
http://www.itu.int/ITU-R/index.html

ITU-R BS.1114-5: Systems for terrestrial digital sound broadcasting to vehicular, portable and fixed receivers in the frequency range 30-3,000 MHz
ITU-R BS.412-9 17, ANNEX 3: Protection ratio for FM sound broadcasting in the case of the same programme and synchronized signals
ITU-R BS.1387-1: Method for objective measurements of perceived audio quality
ITU-R BS.1284-1 General methods for the subjective assessment of sound quality

WORLDCAST SYSTEMS / AUDEMAT DIVISION MENTION REFERENCES
http://worldcastsystems.com/

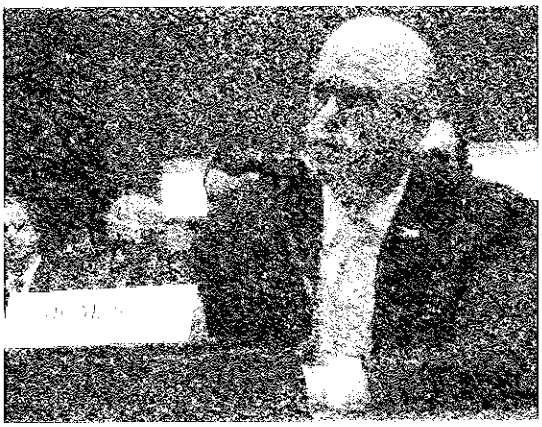
CCIR [Recommendation 638] : Terms and definitions used in planning frequencies for audio and television Broadcasting – Protection ratio in Audio Frequency
CCIR [Recommendation 559-2] : Objective measuring of RF protection ratios in broadcasting – parameters taken into consideration
CCIR [Recommendation 559-2] : Objective measuring of RF protection ratios in broadcasting – Standardised noise spectrum – Colored noise signal used for generator modulation
CCIR [Recommendation 641] : Determining RF protection ratios in audio broadcasting at frequency modulation –Appendix 1 – Maximum deviation of measurement generator frequency
IUT-R [Recommendation BS.450-2] : Transmission standards for audio broadcasting at frequency modulation in metric waves
IUT-R [Recommendation 412-6] : Planning standards for audio broadcasting at frequency modulation in metric waves – Note 4 – Sinusoid signal power
IUT-R [Recommendation 412-7] : Planning standards for audio broadcasting at frequency modulation in metric waves – Appendix 4 – Measuring complete multiplex signal power and peak deviation of an FM audio broadcasting signal
IUT-R [Recommendation 642-1] : Limiters for high quality radio-phonic program signals AFNOR 97330 :Weighting curve representing average musical messages
CEPT/ERC : [Recommendation ERC 54-01 E] – Method of measuring the maximum frequency deviation of FM Broadcast emissions in the band 87,5 MHz to 108 MHz at monitoring stations
UIT-R [Recommendation 704] : Characteristics of reference receivers in audio broadcasting at frequency modulation, at end of planning
UIT-R [Recommendation 599] : Audio broadcasting reception antenna directivity

ATTACHMENT D



Time after time weather emergencies and natural disasters have resulted in a similar frustration for most people holding a cellphone and expecting an immediate connection to help. Whether overloaded circuits or simple service outages due to power losses, it seems those experiences have reinforced to a majority of Americans that the one-to-many infrastructure of broadcasting is more reliable. A just-released survey found 57% of U.S. adults pick local radio and TV as their media of choice during a crisis. That's more than those who answered text messages, online news sites or cable news channels combined, according to the Morning Consult survey commissioned by the National Association of Broadcasters.

NAB chief technology officer Sam Matheny told the House Subcommittee on Communications and Technology that because of the strength of the broadcast infrastructure and the power of the airwaves, local radio and TV stations are often the only



available communications mediums available during disaster situations. "This unique combination of trust and reliability is why, in addition to our ongoing, comprehensive news coverage of emergencies, broadcasters form the backbone of the Emergency Alert System," Matheny reminded lawmakers, noting broadcasters "invest heavily" to prepare for such incidents with redundant power sources, automatic failover processes, back-up generators and substantial fuel reserves. "Local broadcasters take seriously their commitment to protecting the public," he said.

It's a reality that wasn't lost on Rep. Mike Doyle (D-PA). "The commitment that broadcasters have had to emergency alerts and local reporting during times of emergency is commendable," he said. But Doyle said new technologies can't be ignored either. "For far too long this has been the only way for people to get information about emergency events in their regions," he said.

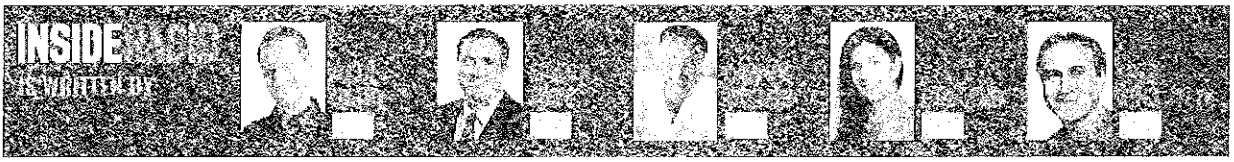
The hearing veered into a show-and-tell, allowing members of Congress to get a first-hand look at the new ATSC 3.0 next-generation television standard currently under review at the Federal Communications Commission. Qualcomm Technology director of engineering Farrokh Khatibi said his team is having almost weekly meetings with the FCC in an effort to meet the year-end time line created by FCC chief Ajit Pai. Beyond the ability to "wake up" a TV on its own even when it's powered off, the new technology will allow local stations to present a wide array of multimedia—such as photos, text, foreign multiple language translations, graphics such as weather radar animations, or even an evacuation route—in addition to standard alert messaging. It will also enable neighborhood-specific geo-targeted messages. "The public safety benefits of next-gen TV and advanced emergency alerting can significantly improve the content, pervasiveness, accessibility and reliability of America's emergency alerting systems and hopefully save lives," Matheny said. As the new voluntary TV technology is adopted by station owners and rolled out during the coming years, Matheny also assured Congress that the broadcast industry will use its airwaves to educate the public.

For all that's changing, Rep. Carl Collins (R-NY) said the focus on emergency alerting can't be separated from the decades-old problem of pirate radio. Unlicensed operators—who he described as "stealing spectrum"—not only don't relay EAS messages or Amber Alerts, but Collins noted their signals also have the potential to interfere with stations that do. He thinks former FCC chair Tom Wheeler wasn't aggressive enough going after pirates, adding that he believes Pai recognizes the disruption that unlicensed stations can cause. "There's a new sheriff in town in that regard," he said.

The NAB's Matheny agreed the pirate problem shouldn't be separated from emergency alerting. "We are very concerned about pirate radio—especially when you consider the daisy chain effect of the EAS and the idea that a pirate radio station might be operating on a frequency that not only interferes with a station, but it could be an [EAS alert] originating station that then prevents downstream stations from receiving that alert," he said.

In January the House passed the Securing Access to Networks in Disasters Act—otherwise known as the SANDy Act. It would ensure that station personnel can cross police lines and access studios and transmitter sites during an emergency situation. It was quickly approved by the Senate Commerce Committee but the legislation (S. 102) has yet to come to a vote in the full Senate.

The SANDy bill has been pushed for the past several years by Rep. Pallone who thinks radio, TV and other communications technologies need to be recognized for their role during a disaster. Several states have already adopted similar laws but supporters say the federal legislation would bring first-responder status nationwide. It could also help avoid the confusion that some broadcasters have faced when federal law enforcement officials are the lead agency during an emergency situation.

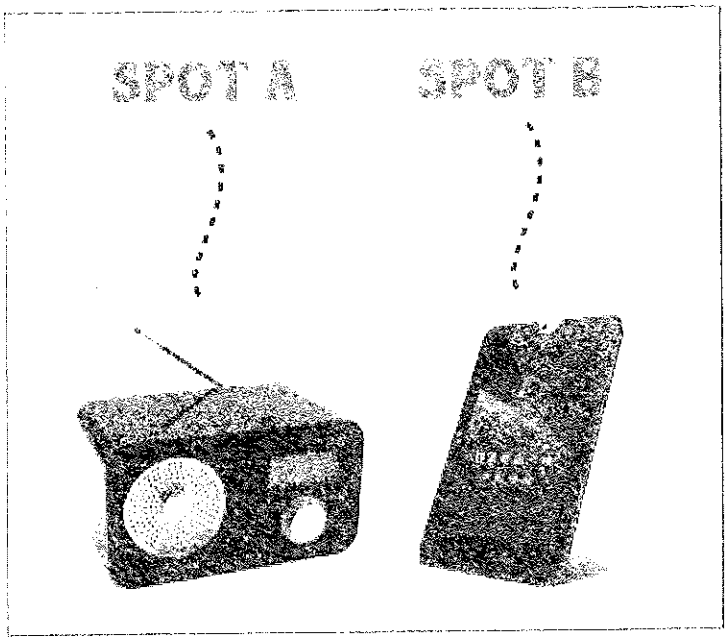


ATTACHMENT E

http://www.insideradio.com/broadcasters-go-beyond-simple-ad-targeting-in-digital-streams/article_84657cca-33c1-11e7-be0c-17c11dea9272.html

Broadcasters Go Beyond Simple Ad Targeting In Digital Streams.

May 8, 2017 Updated 3 hrs ago



With digital listening on the rise, online radio ad breaks are beginning to sound different. On their digital streams, some radio broadcasters are breaking from established advertising patterns, experimenting with new styles of messages and tweaking spot loads. It's AM/FM's ongoing charter of keeping on top of listener and brand needs.

Some stations are streaming fewer ads per hour or offering different ad formats, such as host-read spots or branded-content interstitials. Others are even serving up bonus digital-only content, including weather updates, artist profiles or extra songs. It is all with an eye for attracting more ears.

At a time when more listeners are tuning in via digital platforms—particularly mobile devices—radio managers say they need to innovate to keep up with habits and expectations. And among digital listeners' demands: fewer commercials and more personalized messaging.

"Mobile has raised the bar for content creators. We now have the ability to connect with listeners throughout their day," says Liz Mozian, senior VP/GM of Digital for CBS Radio. "They expect us to understand who they are, to respond to their behavior and to deliver a more customized experience in a way that we couldn't do before."

To accommodate both listeners and advertisers, some broadcasters are going beyond simple targeted ad insertion in their digital live streams, and offering new ad lengths and formats. Armed with big data, stations can target ads for location and demographics. In addition, many radio companies are expanding their digital-only content, where they're free to run any types of ads.

"Digital gives you a different landscape to play. You can create a more direct response experience. You can create branded entertainment. You can do so many things with that airtime," says Univision senior VP, Sales Operations & Development, Fernando Rodriguez. Univision, for instance, digitally replaces ads for its live station streams in both in-market and out-of-market. Univision is also adding digital exclusive content to its Uforia website and mobile app, creating opportunities for non-traditional advertising, such as branded content, sponsorships and host endorsements.

These new approaches come as significant ad dollars are beginning to flow to online radio. Digital audio generated $1.1 billion in ad sales last year, according to a new report on digital ad revenue by the Interactive Advertising Bureau and PWC, marking the first time digital audio accounted for enough spending to warrant its own reporting line. At the same time, digital listening is surging, with 61% of consumers saying they listened to online radio on a monthly basis, up from 20% a decade ago, according to Edison Research and Triton Digital's latest study. And 53% of adults said they tune into online radio on a weekly basis, while an impressive 83% of 12-24-year-olds stream weekly.

"Broadcasters need to quickly understand they're competing with the Pandoras and Spotifys of the world, not just within their local market anymore," says Andrew Jones, director of Solutions Engineering for StreamGuys, which provides streaming services for about 400 radio stations. "Broadcasters should be flexible and willing to try ad models that are different than straight simulcast."

Indeed, popular streaming services such as Pandora and Spotify have set the bar with their lighter commercial loads and targeted ads that can seem hand-selected for the listener. Users who want to avoid ads altogether can opt for commercial-free subscription plans.

Radio listeners have long grumbled that stations air too many commercials, which can account for 12-14 minutes per hour, and, despite some experiments by a handful of stations, most broadcasters largely adhere to the established model on-air. Online, many stations have opted to feed a direct simulcast of their on-air broadcast, including commercials. But that means while pureplays run less than three minutes per hour of ads, a radio simulcast could have 12 minutes per hour.

"If a station just simulcasts what is on-air, there's only minimal value," says Tim Hall, Radio One's senior director of digital sales and operations. "We need to be adding to the on-air content, producing new experiences that benefit first the listener and also our [advertising] partners."

While digital ad insertion is not a new phenomenon, the technology and targeting capabilities have improved greatly. In recent years, many broadcasters, including Cumulus and Emmis, have inserted ads for out-of-market listeners, which generates incremental revenue and improves the listening experience for distant listeners. (An ad for the local pizza chain in Philadelphia doesn't have much relevance for a listener in Seattle, but a national brand message could.)

Now, digital insertion in local markets is on the rise as well. Within the last year, digital executives say, more radio groups are opting for ad replacement in-market. By stripping away the set on-air commercial breaks and spots, stations can experiment with the ad model and, thanks to analytics, they can gauge listener engagement and response. Even if a station retains the on-air schedule and respects ad breaks, they could run fewer ads in each pod and replace some spots with promos, original content or host-read ads, or add a song.

Digital ad insertion requires some technological support, but audio technology companies say the support is widely available among vendors and relatively seamless to listeners. It also requires planning and tending by radio managers and sales reps, but broadcasters say the effort could pay off handsomely. "There is more opportunity separating," says Radio One's Hall. "Streaming ad insertion allows you to target segments of your audience that make sense for your clients."

With digital, stations can target audience segments, including particular demographics, and also direct ads by location. Such targeting can help radio stations lift digital cost-per-thousands, or CPMs, which have lagged behind over-the-air CPMs, industry executives note. Thanks to targeting and creative options, CBS Radio, for instance, says it can charge a premium for in-demand digital inventory.

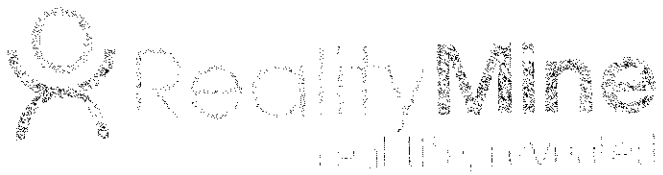
ATTACHMENT F

http://www.insideradio.com/new-research-says-in-car-am-fm-is-point-of/article_811c4c1a-1f53-11e7-9003-e3f5a3473c72.html

FEATURED

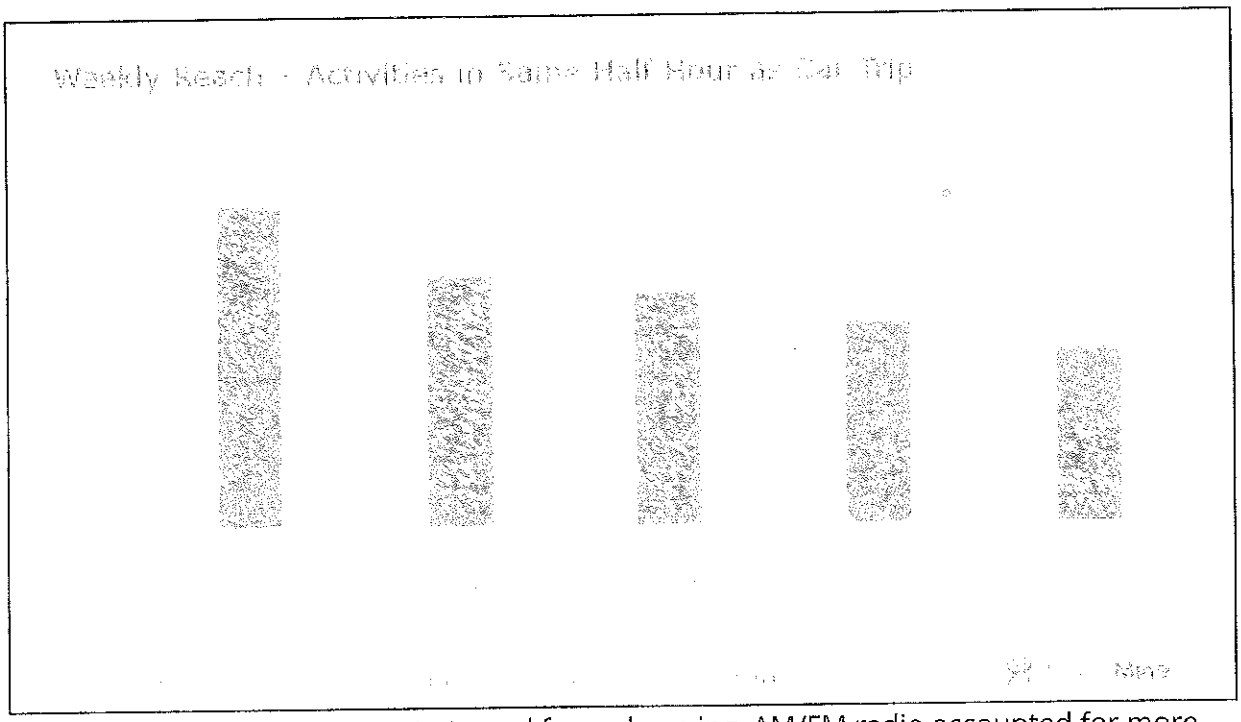
New Research Says In-Car AM/FM Is Point-Of-Purchase King.

9 hrs ago



Erwin Ephron, considered to be the father of modern media planning, famously said that advertising's job is to remind people of the brands they know when they have a need. Now new research reinforces radio's ability to reach needy consumers in the minutes before they make an in-store purchase.

More than half of the U.S. population aged 18-64 (53%) have shopped in a store and been in a car during the same half-hour in a given week, according to data exclusively provided to **Inside Radio** by cross-platform measurement service USA TouchPoints. "Whether that's coming home from or going to the store, there is a direct adjacency there," says Matt Hird, senior research analyst, USA TouchPoints.

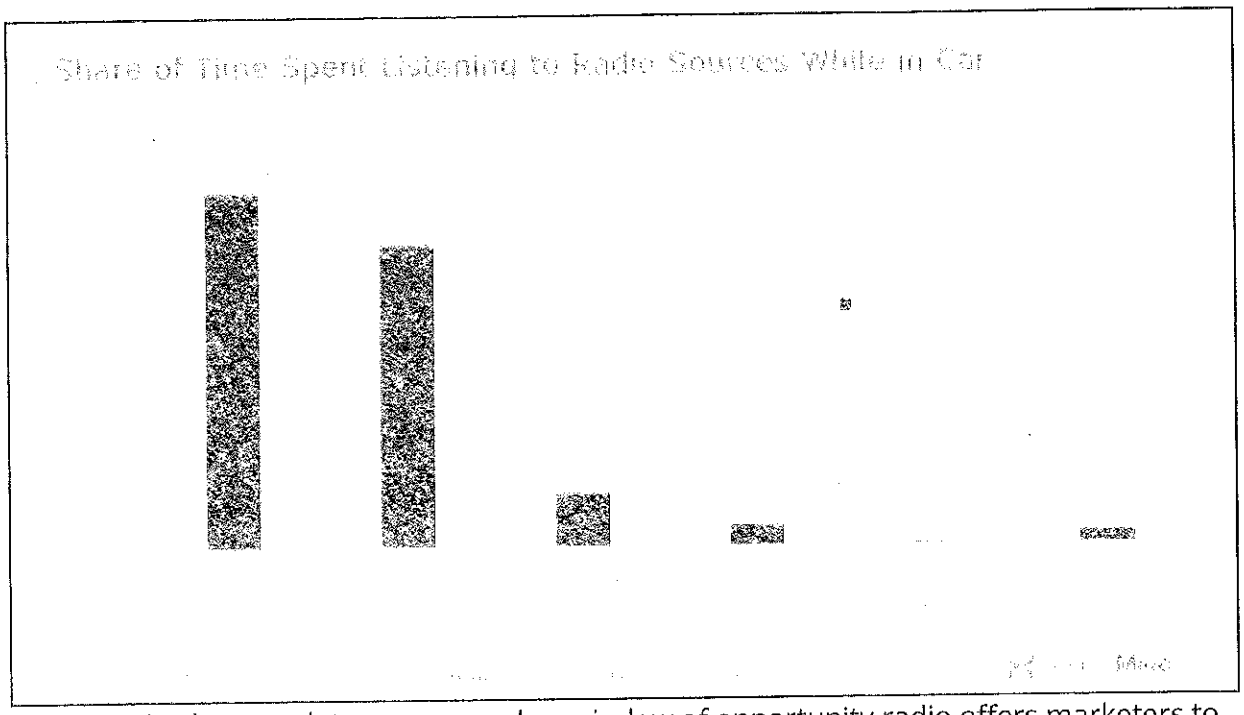


And among consumers en route to and from shopping, AM/FM radio accounted for more than three-fourths of their share of audio time in the car. Broadcast radio (77.4%) topped all other audio sources, including satellite radio (14.3%), CD, record or tape player (4.1%), iPod/MP3 player (3.9%) and streaming audio (1.4%). "AM/FM remains ideally suited for in-car audio while people are going about their daily lives and making their shopping decisions," says USA TouchPoints director of global research Paul Street.

Pierre Bouvard, Cumulus Media and Westwood One chief insights officer, says this new data demonstrates radio's proximity to consumers as they're getting ready to swipe their credit card or plunk down their cash. "We are the soundtrack of America's shopping trips," Bouvard says. "This is the perfect medium to reach people when they are in the shopping mindset and thinking about what brands they want to buy."

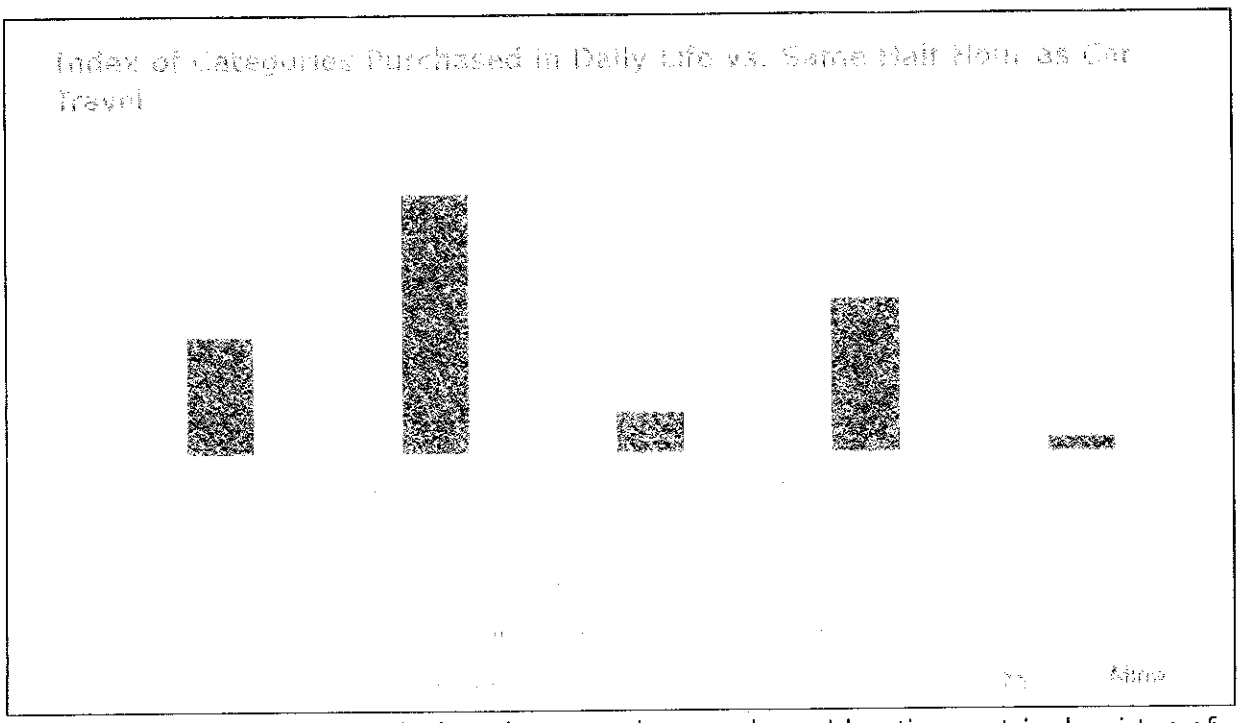
The new data reinforces a separate Starcom Mediavest Group study conducted by USA TouchPoints parent RealityMine that found radio and out-of-home media influence purchase decisions the most. The Starcom study uncovered a 0:91 correlation between audio ads and purchase activity. That's considered to be a very high correlation—the closer you get to one, the higher the correlation between purchase and media exposure.

Pulling the camera back to a wider angle shot off all times Americans spend in a car, not just en route to shopping, USA TouchPoints found the vast majority of audio consumed is through AM/FM. In fact, 40.7% of the time that someone is in a vehicle, they're listening to some sort of conventional radio, either terrestrial (34.6%) or satellite (6.2%).



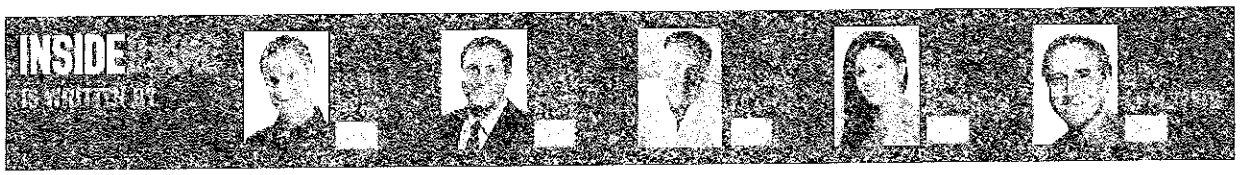
Importantly, the new data uncovers a key window of opportunity radio offers marketers to influence consumers as they're in their cars going about their busy lives. Fast food purchases, for example, are 57% more likely to be considered in the same half-hour as car travel than they are in daily life. "There is no more perfect ad medium for fast food than AM/FM," Bouvard says. "You've got me in the car, I don't have a refrigerator in the back seat, I'm hungry, and I'm sitting in something that can take me to the actual place that will feed me the burger and fries."

Fast food isn't the only product purchase more likely to be considered within 30 minutes of car travel. In fact, the restaurant and bar category has a major in-car opportunity to influence consumers. "Of all the hours in a week that somebody is considering a purchase at a restaurant or a bar, they are 49% more likely to be in a car vs. the rest of the week while they are considering that purchase," Hird says. These numbers reflect all travel in the car and not just en route to or from shopping.



USA TouchPoints is able to calculate these purchase and consideration metrics by virtue of its methodology. In addition to passive measurement, the service uses an e-diary wherein survey panelists enter their media usage, along with other information, every 30 minutes.

The data shows consideration frequently translates into purchase. Fast food is 72% more likely to be purchased in the same half-hour as car travel, health/pharmacy products are 43% more likely to be purchased, groceries (33%), house and garden (12%) and pet related goods (5%).



ATTACHMENT AA

This engineering statement is prepared in conjunction with comments filed by Shainis & Peltzman, Chartered ("S&P) pursuant to FCC Public Notice 17-58, Commission Launches Modernization of Media Regulation Initiative .

My name is Bertram S. Goldman. I have worked in the field of AM and FM broadcast engineering for over forty years. I have filed numerous applications with the Commission and my qualifications are a matter of record with the FCC. In my career, I have focused on the design and implementation of FM booster technology and have made presentations regarding booster design at National Association of Broadcaster's conventions. I have experimented with booster synchronization as early as 1989.

Most recently, I have worked as a consultant with Geo Broadcast Solutions, developing multiple node (multiple transmitter) booster systems known as "Maxxcasting™" systems. These systems use several boosters synchronized both with the main transmitter and with each other to produce nearly seamless transitions between nodes to cover a targeted area and to provide better coverage in these targeted areas than possible with only the main transmitter. I have worked with Geo as well, evaluating the "Zonecasting™" system in FCC authorized tests. Zonecasting combines the attributes of "Maxxcasting" during most of the broadcast day, however, during limited times, localized information is broadcast only on the booster nodes. During the times when localized information is broadcast, the operation is called "Zonecasting".

Below I will discuss how advances in technology, not available until the last year or two, have allowed us to develop advanced, tightly synchronized booster systems which allow us to do things never before possible.

Booster synchronization requires four things to "trick" the receiver into thinking that it's hearing one station instead of two or more (with resulting distortion and interference). They are:

1. Carrier Synchronization, now possible by using GPS trained oscillators.
2. Pilot phase synchronization, again possible by GPS
3. Use of small cells with highly directional antennas to keep the real-time FM waveforms at the receiver to within 2 microseconds. The technology to adjust the timing to within 2 microseconds difference has only been perfected within the last year. RF modeling and prediction is accomplished with powerful software tools developed for cellular communications by the wireless industry and this allows us to precisely tailor parameters to maximize coverage and minimize areas of interference.
4. Maintaining audio modulation to less than 0.25dB difference between the main and all nodes. This has only been possible recently by AES digital transmission and synchronization.

For Zonecasting, although items three and four cannot be accomplished due to different program material on the main and booster nodes, items one and two remain synchronized. The antennas in item three tightly controls where the different programming goes and tightly rolls off the signal at the edge of coverage to keep any interference minimized. We have found that maintaining modulation peaks as close to identical as possible (even though it's different programming) further helps reduce interference between the main and zone area.

In tests conducted at WIIL in Milwaukee, the results were impressive. During times of fully synchronized Maxxcasting operation, in-building listening to WIIL, which was previously difficult since Milwaukee is on the edge of the station's 54dBu class B contour, was instead receiving 70-80dBu of solid signal in downtown buildings with virtually no discernable transition areas. When the different programming and additional transmitters were introduced for Zonecasting, transition areas were tightly controlled and any self-interference was limited to only a couple city blocks, only a very small percentage of the overall coverage area and for a very limited period of time.

In conclusion, in my professional opinion, the FCC requirement, found in Section 74.1231(i) of the Commission rules, requiring that booster programming for full power FM stations be identical to the main at all times has outlived its usefulness. Due to advances in synchronization technology and RF

modeling, it is now possible for synchronized boosters to not only improve coverage in shadowed areas, but also within a station's coverage area, allow specialized targeted information to be delivered with diminimis negative impact to listeners in the small and tightly controlled transition areas.

CERTIFICATION

The undersigned hereby certifies that the foregoing statement and associated attachments were prepared by him or under his direct supervision, and that they are true and correct to the best of his knowledge and belief.

Bertram S. Goldman
Goldman Engineering Management, Inc

ATTACHMENT BB

FCC NEWS from the Federal Communications Commission

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For Immediate Release

FCC PROPOSES TO ADD BLUE ALERTS TO THE NATION'S EMERGENCY ALERT SYSTEM

Proposal Aims to Protect Law Enforcement Officers and Communities

WASHINGTON, June 22, 2017 – The Federal Communications Commission today proposed to add an alert option to the nation's Emergency Alert System (EAS) to help protect the nation's law enforcement officers. Called a "Blue Alert," the option would be used by authorities in states across the country to notify the public through television and radio of threats to law enforcement and to help apprehend dangerous suspects.

Blue Alerts can be used to warn the public when there is actionable information related to a law enforcement officer who is missing, seriously injured or killed in the line of duty, or when there is an imminent credible threat to an officer. As a result, a Blue Alert could quickly warn you if a violent suspect may be in your community, along with providing instructions on what to do if you spot the suspect and how to stay safe.

The proposal, in a Notice of Proposed Rulemaking (NPRM) adopted today, would amend the FCC's EAS rules by creating a dedicated Blue Alert event code so that state and local agencies have the option to send these warnings to the public through broadcast, cable, satellite, and wireline video providers.

While some states have individual Blue Alert programs that use various methods to issue these warnings, the proposal is intended to support the development of a national framework that states can adopt. This goal is consistent with the Rafael Ramos and Wenjian Liu National Blue Alert Act of 2015. The Act, which is being implemented by the Department of Justice's Office of Community Oriented Policing Services (COPS Office), directs cooperation with the FCC. The COPS Office has expressed the need for a dedicated EAS code for Blue Alerts.

The NPRM invites public comment on the proposal.

Action by the Commission June 22, 2017 by Notice of Proposed Rulemaking (FCC 17-74). Chairman Pai, Commissioners Clyburn and O'Rielly approving and issuing separate statements.

PS Docket No. 15-94

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This is an unofficial announcement of Commission action. Release of the full text of a Commission order constitutes official action. See MCI v. FCC, 515 F.2d 385 (D.C. Cir. 1974).